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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

GASTROENTEROLOGY ABSTRACTS and CITATIONS is published monthly and includes citations and abstracts from the biomedical world literature as they are currently received. Volume 7 appeared in, and was dated 1973. There was no hiatus in literature coverage from Volume 6 which was dated 1971. In addition, yearly cumulated subject and author indexes are published.

This publication is available free to National Institutes of Health grantees and contractors working in the field of gastroenterology and libraries of medical schools. Requests from these qualified individuals to receive free copies of this publication must include their grant or contract number and the title of their project. These requests as well as address changes and other communications should be addressed to:

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1975.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *World Medical Periodicals*, 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans
Ar.	Arabic
Bul.	Bulgarian
Ch.	Chinese
Cz.	Czech
Dan.	Danish
Dut.	Dutch
E.	English
Eston.	Estonian
Fin.	Finnish
Fl.	Flemish
Fr.	French
Ger.	German
Gr.	Greek
Heb.	Hebrew
Hun.	Hungarian
Ic.	Icelandic
In.	Indonesian
It.	Italian
Jap.	Japanese
Kor.	Korean
Latv.	Latvian
Lith.	Lithuanian
Nor.	Norwegian
Pol.	Polish
Por.	Portuguese
Rum.	Rumanian
Rus.	Russian
Ser.	Serbo-Croatian
Sl.	Slovak
Sp.	Spanish
Sw.	Swedish
Th.	Thai
Turk.	Turkish
Uk.	Ukrainian
Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
ATP	adenosine triphosphate
BSP	sulfobromophthalein
C	degrees centigrade
cm	centimeter(s)
CNS	central nervous system
cpm	counts per minute
DNA	deoxyribonucleic acid
e.g.	for example
g	gram(s)
μg	microgram(s)
hr	hour(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kg	kilogram(s)
LD$_{50}$	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar
mEq	milliequivalent(s)
mM	millimolar
μM	micromolar
mC,μC	milli-,microcurie(s)
mg	milligram(s)
min	minute(s)
ml	milliliter(s)
mm	millimeter(s)
MTD	maximum tolerated dose
ng	nanogram (10^{-9})
pg	picogram (10^{-12})
p.o.	orally
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
Rev.	review (only in citations)
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

NOTE

Due to circumstances beyond our control, *Gastroenterology Abstracts and Citations*, Volume 7, Number 4, April 1973 inadvertently was mailed to another mailing list. We have arranged for additional copies to be printed and mailed to the *Gastroenterology Abstracts and Citations* mailing list. This should occur in the very near future.

We regret this inconvenience to our readers, and this office will continue surveillance to make sure that this issue will be mailed out correctly as soon as possible.

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

0001 SEPARATION OF LIPASE-POSITIVE CELLS FROM SUSPENSIONS OF PANCREAS CELLS IN AN ISOKINETIC GRADIENT OF FICOLL IN TISSUE CULTURE MEDIUM.

(E.) Blackmon, J.; Pitts, A.; Pretlow, II, T.G. (Dept. Pathol., Univ. Alabama, Birmingham). *Am. J. Pathol.* 72(3):417-426, 1973.

Lipase-positive cells were separated from suspensions of hamster pancreas cells both by velocity sedimentation and isopycnic sedimentation in polysucrose gradients. Lipase-positive cells were 51.0% of the disaggregated pancreas cells in the starting sample suspension. The purest gradient fractions from experiments using velocity sedimentation for cell separation contained a mean of 98.8% lipase-positive cells. Cell separation using isopycnic centrifugation was less effective than cell separation using velocity sedimentation and resulted in a mean purity of only 89.8% lipase-positive cells. Lipase positivity was assessed using the Gomori technique with the conditions for fixation slightly modified to be suitable for disaggregated cells. The current method used for purification of pancreatic exocrine cells should be useful for studying protein synthesis and differentiation *in vitro* in a single kind of cell independent of the other cell types, unknown hormonal stimuli, nutritional variations, and nervous stimuli which are present *in vivo*.

0002 THE INFLUENCE OF TRIIODOTHYRONINE AND RIBOFLAVIN DEFICIENCY ON THE RAT LIVER WITH SPECIAL REFERENCE TO MITOCHONDRIA. A MORPHOLOGIC, MORPHOMETRIC, AND CYTOCHEMICAL STUDY BY ELECTRON MICROSCOPY.

(E.) Reith, A. (Norwegian Radium Hosp., Oslo). *Lab. Invest.* 29(2):216-228, 1973.

Morphometric and cytochemical methods were used to study the fine structure of the rat liver during thyroid hormone influence (25 μg/100 g) and riboflavin deficiency for 83 days. Thyroid hormone caused a decrease in the number of mitochondria, the volume fraction of smooth endoplasmic reticulum and glycogen, and the average size of a hepatocyte. Increases occurred . the surface of the cristae membranes, the number of microbodies, and the volume and surface of the outer and cristae membrane of the average mitochondrion. Riboflavin deficiency caused a decrease in the mitochondrial fractional volume and the surface of the cristae membranes; and an increase in the average size of a hepatocyte and the fractional volume of microbodies, the smooth endoplasmic reticulum, and the glycogen. Thyroid hormone administered during riboflavin deficiency caused marked biogenesis of mitochondria in terms of an increase of their number, their fractional volume, and the surface area of their outer and inner boundary membranes and cristae membranes. This state was also characterized by remarkable mitochondrial forms: mitochondria with transverse partitions, mitochondria with elongated cristae forming membrane stacks which displayed cytochrome oxidase activity, and a larger number of cupshaped and dumbbell-shaped organelles. The last mentioned forms were interpreted as a cytologic indication of mitochondrial biogenesis.

0003 ACINAR CELL PROLIFERATION IN THE RAT PANCREAS DURING EARLY POSTNATAL GROWTH.

(E.) Sesso, A.; Abrahamsohn, P. A.; Tsanaclis, A. (Biomed. Inst., Univ. Sao Paulo, Brazil). *Acta Physiol. Lat. Am.* 23(1):37-50, 1973.

During days 2 to 20-23 of postnatal life the mitotic and labeling indices of the pancreatic acinar cells in white Wistar rats are distinctively higher than those observed by the 30th day and onward. The evolution of these indices and of the total pancreatic DNA suggested that during the initial postnatal period the acinar cells might be expanding in number exponentially. Ultrastructural analysis indicated that all the mitotic cells in the acini are fully differentiated zymogenic cells. Repeated thymidine-^3H injections to suckling rats showed that at least 90% of the acinar cells derive from division of preexisting differentiated cells. Estimation of the acinar cell cycle parameters showed that the generation time T, G_1, S, G_2 and mitosis last 111 hr, 97 hr, 9.5 hr, 2.8 hr and 1.3 hr, resp. Significant cytophysiological changes occur in the acinar cell coincidental with the period of high mitotic activity. The amount of cytoplasmic RNA is low during the initial 2 postnatal weeks; it then rises rapidly until the 30-40th day when adult levels are reached. The ability to incorporate tritiated amino acids into migratory proteins also rises continuously from day 2 until the end of the 1st month post partum. Thus, it is apparent that the highest level of mitotic activity occurs in differentiated cells which have not yet attained full maturity.

0004 METABOLICALLY ACTIVE, SINGLE CELL PREPARATIONS FROM THE MUCOSAL EPITHELIUM OF RABBIT SMALL INTESTINE.

(E.) Padron, J.; Gallagher, J. T.; Kent, P. W. (Dept. Biochem., Univ. Oxford, England). *Br. J. Exp. Pathol.* 54(4):347-351, 1973.

Limited treatment with papain has liberated isolated epithelial cells from the epithelial mucosa of the rabbit small intestine. Such cell populations retain their brush borders, have a Q_{O_2} of -10 μl O_2/mg protein/hr and incorporate D[^{14}C]glucosamine into 3 high molecular weight components having certain electrophoretic properties characteristic of glycoproteins. The pattern of radioactive labeling in these 3 macromolecules suggests that the slowest moving electrophoretic component, which contained the highest level of radioactivity, may be a precursor of one of the faster moving components. The results of this study demonstrate the efficacy of the limited papain method of digestion for preparing metabolically active cells from rabbit intestinal epithelium capable of maintaining the biosynthesis of glycoproteins. This system should be valuable for studying glycoprotein metabolism in epithelial cells without interference from sub-epithelial tissues, and in evaluation pharmacologically active agents for their therapeutic value.

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

0005 MORPHOLOGY AND DISACCHARIDASE LEVELS OF JEJUNAL BIOPSY SPECIMENTS FROM HEALTHY BRITISH SUBJECTS. *(E.)* Pena, A. S.; Truelove, S. C.; Whitehead, R. (Gastroenterol. Dept., Ziekenhuis, Leiden, Netherlands). *Digestion* 8(4):317-323, 1973.

The morphological features of jejunal biopsy specimens from 21 healthy British volunteers were studied. In addition to finger-like villi, a feature in every case, and narrow leaf-shaped villi, present in 14 cases, 3 biopsies showed broad leaves and/or short ridges. Quantitative histological methods provided a yardstick with which to compare one specimen with another. Such measurements are of obvious use in determining whether a given biopsy specimen falls in a normal morphological range. Disaccharidase activity was also estimated and the mean values for lactase, sucrase, and maltase were, resp., 4.8, 7.9, and 22.4 U/g wet weight of tissue. Two subjects gave definite evidence of hypolactasia.

0006 THE CELL CYCLE TIME IN THE FLAT (AVILLOUS) MUCOSA OF THE HUMAN SMALL INTESTINE. *(E.)* Wright, N.; Watson, A.; Morley, A.; Appleton, D.; Marks, J.; Douglas, A. (Dept. Pathol., Univ. Newcastle upon Tyne, England). *Gut* 14(8):603-606, 1973.

A hyperproductive mucosal state in gluten-sensitive enteropathy has been proposed on the basis of an elevated mitotic index, but this parameter depends on the mitotic duration when used as an index of proliferative status. The mitotic duration was therefore measured in 2 control patients with normal villous mucosae (a 61-yr-old man with diagnosis of rosacea and leg ulceration resulting from stasis and another 61-yr-old man with diarrhea) and in 2 patients with the flat avillous mucosa of untreated gluten-sensitive enteropathy (a 37-yr-old man with dermatitis herpetiformis and megaloblastic anemia due to folic acid deficiency, and a woman aged 55 yr with untreated celiac disease). Two different stathmokinetic techniques with vincristine were used. No significant difference in mitotic duration was found, but values obtained for cell cycle time showed a halving in the flat mucosae. An increased rate of cell production in the small bowel mucosa of untreated gluten-sensitive enteropathy is thus confirmed.

0007 HORMONAL CONTROL OF PANCREATIC GROWTH. *(E.)* Mainz, D. L.; Black, O.; Webster, P. D. (VA Hosp., Augusta, Ga.). *J. Clin. Invest.* 52(9):2300-2304, 1973.

The effects of chronic administration of bethanechol and cholecystokinin-pancreozymin (CCK-PZ) on the pancreas were studied. Male albino rats were given saline, bethanechol, (6 mg/kg), or CCK-PZ (20 U/kg) i.p. twice daily for 5 days. Bethanechol administration caused a 20% increase in pancreatic weight and a 33% increase in mg protein/100 µg DNA. In bethanechol-treated groups, amounts of DNA/g body weight and incorporation of [^{14}C]thymidine into DNA were similar to controls. CCK-PZ administration caused a 71% increase in pancreatic weight and a 38% increase in mg protein/100 µg DNA. In CCK-PZ-treated groups, amounts of DNA/g increased 42% and [^{14}C]thymidine incorporation into DNA increased 185%. Thus, bethanechol administration was associated with increases in pancreatic cell mass (hypertrophy). CCK-PZ was associated with increases in cell mass and cell numbers (hypertrophy and hyperplasia). This information suggests that CCK-PZ is important in maintaining pancreatic functional integrity. Although bethanechol and CCK-PZ elicit similar secretory responses, their mode of action on the cell appears to be different at least as far as growth influences are concerned.

0008 THE GOLGI COMPLEX. I. ISOLATION AND ULTRASTRUCTURE IN NORMAL RAT LIVER. *(E.)* Sturgess, J. M.; Katona, E.; Moscarello, M. A. (Hosp. Sick Children, Toronto, Canada). *J. Membr. Biol.* 12(4):367-384, 1973.

The ultrastructural arrangement of membranes of the Golgi complex was characterized in Golgi fractions isolated from the livers of male Wistar rats. A modified method for isolation of these fractions provided a good yield of Golgi membranes (60 to 70%) is obtained with greater than 50-fold purification of sialyl transferase, an enzyme specific for the Golgi complex. The isolated membranes appear well preserved, and both the dimensions and appearance of the Golgi complex observed by negative staining and in sections of the isolated membranes correlate well with that in liver sections. The Golgi complex comprises a series of plate-like structures, each consisting of a central sac or cisterna surrounded by a network of fine tubules. The tubules increase in diameter toward the periphery of the plate and are associated with the formation of vacuoles or secretory vesicles. Indirect evidence has indicated that these tubules are the site of glycoprotein biosynthesis, and it seems likely that macromolecular carbohydrate materials pass through them. The manner in which the structure of the Golgi complex is related to its role in glycoprotein biosynthesis is under study.

0009 SCANNING ELECTRON MICROSCOPY OF RAT'S LIVER. APPLICATION OF FREEZE-FRACTURE AND FREEZE-DRYING TECHNIQUES. *(E.)* Brooks, S. E. H.; Haggis, G. H. (Dept. Pathol., Univ. West Indies, Kingston, Jamaica). *Lab. Invest.* 29(1):60-64, 1973.

Portal vein perfusion of the liver of male Sprague-Dawley rats was carried out with Ringer's solution followed by 2.5% glutaraldehyde. Liver samples were postfixed in osmium tetroxide, washed in distilled water, snapfrozen in Freon-12, and fractured at -150 C. After freeze-drying at -80 C., a thin layer of carbon and gold was applied under vacuum. Sinusoidal fenestrations and the relation of the endothelial cells to hepatocyte microvilli and reticulin fibers were delineated using the scanning electron microscope. Images of bile canaliculi and adjoining plasma membranes were obtained. These techniques have great potential for the study of a variety of liver diseases, particularly because large areas of the linings can be examined and areas showing pathologic change might be detected which would not be observed by other forms of microscopy.

0010 THE RESPONSE OF SMOOTH MUSCLE CELLS IN THE RABBIT COLON TO ANAL STENOSIS: A PRELIMINARY REPORT. *(E.)* Brent, L. (Roy. Children's Hosp., Melbourne, Australia). *Pathology* 5(3):209-218, 1973.

The morphological responses of smooth muscle cells in the colon to different degrees of anal stenosis, and the cell changes subsequent to release of that obstruction were studied in growing and adult rabbits. The colon reacted first by dilatation then by thickening of the wall. Microscopically apparent were disruption of the muscle layers, cellular hypertrophy, increased connective tissue, and mitosis of smooth muscle cells. The sequence of cellular hypertrophy was -cytoplasmic enlargement, nuclear enlargement, mitosis, and cellular hyperplasia. Quantitation revealed that cellular hypertrophy up to 3 times the normal value occurred in proportion to the duration and degree of obstruction. In the adult animal, the muscular thickening was due mainly to hypertrophy with only a 20-30% increase in cell population. In the growing rabbit, hyperplasia and hypertrophy contributed equally to the total muscular thickening. Cell and nuclear size slowly decreased upon release of obstruction, but the increased cell numbers remained.

0011 PANCREATIC AND HEPATIC ULTRASTRUCTURE IN OFFSPRING OF RABBITS WITH PROTEIN MALNUTRITION. *(E.)* Wellmann, K. F.; Adachi, M.; Volk, B. W. (Kingsbrook Jewish Med. Ctr., Brooklyn, N.Y.). *Virchows. Arch* [*Pathol. Anat.*] 360(4):327-337, 1973.

Pregnant New Zealand rabbits (10) were fed a low-protein, low-fat, high-carbohydrate diet during the second half of gestation and during the subsequent period of lactation. Baby rabbits (31) born to these protein-restricted does and suckled by them for 2 or more weeks showed loss of fur, stunted growth, fatty metamorphosis, and increased glycogen storage in the liver, and atrophy of pancreatic acinar cells associated with loss of zymogen granules as well as widespread cytoplasmic vacuolization. It is likely that these changes are not merely the effect of caloric restriction but also reflect a more specific nutritional deficiency (protein deficiency).transmitted by the mother rabbit to her offspring. Occasionally lipid globules in hepatocytes were manifest before pancreatic acinar cell alterations. This suggests that hepatic lesions in protein malnutrition result directly from the deficient diet and are not secondary to pancreatic changes.

0012 REGENERATION OF THE INTESTINAL MUCOSA AFTER SELECTIVE NECROSIS: FUNCTIONAL, MORPHOLOGICAL, AND MICROCIRCULATORY STUDY. *(Fr.)* Mirkovitch, V.; Robinson, J. W. L.; Fischer, A.; Winistorfer, B. (Cantonal Hosp., Lausanne, Switzerland). *Helv. Chir. Acta* 40(1/2):291-294, 1973.

Intestinal necrosis was selectively induced in the mucosa of male and female dogs by introducing 6 to 20 ml of a 10% formaldehyde solution into the lumen of a loop of small intestine and draining it out 10 min later. The muscularis propria remained intact, but active transport ceased. An inflammatory reaction appeared in the submucosa during the first 24 hr when mucosal circulation stopped. After 1 week the acellular remnants of mucosal phantoms were partially covered with granulation tissue. Regenerative proliferation began during the 2nd week with a unicellular layer, but villi appeared again only at the end of 4 weeks. The final structure of regenerated mucosa differed from that in intestinal loops of untreated controls. Formaldehyde-treated intestinal loops were shorter and covered with pale mucosa. Loops which lost more than 40% of their original length became stenotic, and no mucosal regeneration occurred over the surface treated with formaldehyde. Histologically, the villi in this regenerated mucosa were shorter, thicker, and irregular in shape. Despite pronounced inflammation, microcirculation was good and active transport was normal. No explanation can be offered for the appearance of isolated groups of enterocytes during the 3rd week or for shortening and stenosis of the intestinal loops.

0013 ULTRASTRUCTURE, CYTOCHEMISTRY, AND BIOGENESIS OF GASTROINTESTINAL MUCINS. *(Fr.)* Thiery, J. P. (Res. Ctr., Ivry, France). *Ann. Anat. Pathol. (Paris)* 17(3):307-326, 1972.

0014 MORPHOMETRIC STUDIES BY MEANS OF AUTOMATIC ANALYSIS OF MICROPHOTOGRAPHS OF MURINE LIVERS FOLLOWING OESTRASTILBEN APPLICATION. *(Ger.)* Simon, H.; Arnold, F.; Kemmer, C.; Kunze, K. D.; Meyer, W.; Recknagel, R.; Wagner, H. (C. G. Carus Acad. Med., Dresden, Germany). *Exp. Pathol.* 8:48-57, 1973.

0015 REVISED WIESBADEN CLASSIFICATION OF GUT ENDOCRINE CELLS. *(E.)* Solcia, E.; Pearse, A. G. E.; Grube, D.; Kobayashi, S.; Bussolati, G.; Creutzfeldt, W.; Gepts, W. (Diag. Inst. Pathol. Univ. Pavia, Italy). *Rend. Gastroenterol.* 5(1):13-61, 1973.

0016 LIVER CHANGES AFTER INTRAPERITONEAL ADMINISTRATION OF RADIOACTIVE GOLD. *(Ger.)* Morgenroth, K.; Verhagen, A. (Pathol. Inst., Univ. Munster/Westphalia, Germany). *Verh. Dtsch. Ges. Pathol.* 56:463-466, 1972.

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

0017 CHANGES IN THE SYMPATHETIC NERVES IN THE PAROTID GLAND FOLLOWING GUANACLINE MEDICATION. ULTRASTRUCTURAL OBSERVATIONS. *(Ger.)* Donath, K.; Seifert, G.; Pirsig, W. (Pathol. Inst., Univ. Hamburg, Germany). *Virchows Arch. (Pathol. Anat.)* 360(3):195-207, 1973.

0018 ACTH-INDUCED STRUCTURAL CHANGES IN NUCLEOPROTEIN COMPLEX FROM LIVER NUCLEI OF YOUNG AND OLD RATS. *(Ger.)* Lohr, J. (Inst. Pathol., Univ. Mainz, Germany). *Gerontologia* 18(2-3):113-121, 1972.

0019 ELECTRON MICROSCOPIC EXAMINATION OF HEPATIC SUBCELLULAR FRACTIONS FOR PHOSPHATASES. *(E.)* El Aaser, A. A.; Fitzsimons, J. T. R.; Hinton, R. H.; Norris, K. A.; Reid, E. (Wolfson Bioanal. Ctr., Univ. Surrey, Guildford, England). *Histochem. J.* 5(3):199-223, 1973.

0020 HISTOCHEMICAL EVIDENCE FOR LIPOIDAL MATERIAL IN SECRETORY GRANULES OF RAT SALIVARY GLANDS. *(E.)* Simson, J. A. V.; Hall, B. J.; Spicer, S. S. (Med. Univ. South Carolina, Charleston). *Histochem. J.* 5(3):239-254, 1973.

0021 HEPATOMEGALY: PARAMETER OF CHRONIC EXPERIMENTAL DRUG TOXICITY. *(E.)* Sethi, N.; Talwalkar, V.; Mukherjee, S. K. (Cent. Drug Res. Inst., Chattar Manzil Palace, Lucknow, India). *Indian J. Physiol. Pharmacol.* 16(4):339-343, 1972.

0022 THE FINE STRUCTURE OF HAEMOPOIESIS IN THE HUMAN FETAL LIVER. I. THE HAEMOPOIETIC PRECURSOR CELLS. *(E.)* Hoyes, A. D.; Riches, D. J.; Martin, B. G. H. (St. Mary's Hosp., London, England). *J. Anat.* 115(1):99-111, 1973.

0023 HISTOLOGICAL CHANGES OF THE DOG SALIVARY GLANDS AND THE PANCREAS INDUCED BY BILE, SODIUM TAUROCHOLATE OR SUNFLOWER OIL INJECTED INTO THE EXCRETORY DUCTS. *(E.)* Fodor, I.; Papp, M. (Inst. Exp. Med., Hungarian Acad. Sci., Budapest). *Acta Morphol. Acad. Sci. Hung.* 20(3-4):231-239, 1972.

0024 INCREASED NUCLEAR DIAMETER OF GASTRIC PARIETAL CELLS AFTER X-IRRADIATION IN THE GUINEA PIG. *(E.)* Capoferro, R. (Rikshosp., Oslo, Norway). *Acta Pathol. Microbiol. Scand.* [*A*] 81(8):591-592, 1973.

0025 COMPARATIVE HISTOPATHOLOGY OF SCHISTOSOME GRANULOMAS IN THE HAMSTER. *(E.)* Von Lichtenberg, F.; Erickson, D. G.; Sadun, E. H. (Peter Bent Bringham Hosp., Boston, Mass.). *Am. J. Pathol.* 72(2):149-168, 1973.

0026 RELEASE AND RESTORATION OF THE SECRETORY GRANULES IN THE CONVOLUTED GRANULAR TUBULES OF THE RAT SUBMANDIBULAR GLAND. *(E.)* Cutler, L. S.; Chaudhry, A. P. (Sch. Med., State Univ. New York, Buffalo). *Anat. Rec.* 176(4):405-420, 1973.

0027 TISSULAR LOCALIZATION OF ANTIGENS IN THE DIGESTIVE SECRETIONS BY IMMUNOFLUORESCENCE. *(Fr.)* Delpech, A. (C. Nicolle Hosp., Rouen, France). *Ann. Anat. Pathol. (Paris)* 17(3):341-348, 1972.

0028 HISTOCHEMISTRY OF GASTROINTESTINAL MUCINS. *(Fr.)* Ganter, P. (Hotel Dieu, Paris, France). *Ann. Anat. Pathol. (Paris)* 17(3):251-278, 1972.

0029 CENTRIOLES AND CILIA IN FOETAL PANCREATIC CELLS OF THE MOUSE. *(E.)* Cadete Leite, A. (Lab. Human Normal Anat., Univ. Luanda, Angola). *J. Submicr. Cytol.* 5(2):147-152, 1973.

See also, 0031, 0044, 0201, 0214, 0226, 0396, 0635.

ABSORPTION—EXCRETION—TRANSPORT

0030 THE EFFECT OF CONJUGATED AND UNCONJUGATED BILE ACIDS ON WATER AND ELECTROLYTE ABSORPTION IN THE HUMAN JEJUNUM. *(E.)* Russell, R. I.; Allan, J. G.; Gerskowitch, V. P.; Cochran, K. M. (Roy. Infirm., Glasgow, Scotland). *Clin. Sci. Mol. Med.* 45(3):301-311, 1973.

A perfusion system employing a proximal occluding balloon was used to study the effect of conjugated and unconjugated bile acids in various concentrations on the absorption of water, sodium, and chloride in the proximal jejunum in man. Unconjugated cholic acid and its glycine and taurine conjugates

had no significant effect on water and electrolyte absorption. Water and electrolyte absorption were significantly inhibited by unconjugated deoxycholic acid (3 mM) and net secretion occurred at concentrations of 5, 7, and 10 mM. When taurodeoxycholic and glycodeoxycholic acid solutions were used, similar results were obtained. A greater effect was noted with higher concentrations of bile acids. Unconjugated chenodeoxycholic acid caused net water and electrolyte secretion at 3 mM concentration. This effect was more marked with higher concentrations of bile acid. Taurochenodeoxycholic acid (3 mM) also caused inhibition of absorption, and net secretion occurred at a concentration of 10 mM. The results show that dihydroxy bile acids, conjugated or unconjugated, inhibit water and electrolyte absorption in the proximal jejunum in low concentration and cause net secretion in high concentration.

0031 REGULATION OF CHOLESTEROL METABOLISM IN THE DOG. II. EFFECTS OF COMPLETE BILE DIVERSION AND OF CHOLESTEROL FEEDING ON POOL SIZES OF TISSUE CHOLESTEROL MEASURED AT AUTOPSY.

(E.) Pertsemlidis, D.; Kirchman, E. H.; Ahrens, Jr., E. H. (Mt. Sinai Sch. Med., New York, N.Y.). *J. Clin. Invest.* 52(9):2368-2378, 1973.

The effects of high-cholesterol diets or bile diversion on the sizes of body cholesterol pools were studied at autopsy in 6 adult pedigreed dogs. Total body cholesterol was determined by measuring the cholesterol content of discrete organs and of the eviscerated carcass. Neither cholesterol feeding nor bile diversion altered total body cholesterol or the cholesterol content of individual organs and tissues. Thus, high-cholesterol feeding did not lead to substantial expansion of tissue cholesterol pools. When estimated from isotopic data, the total amount of exchangeable cholesterol in animals with an intact enterohepatic circulation was essentially the same as that measured chemically. Apparently there was little or no nonexchangeable cholesterol in these dogs, except in skin and nervous tissue, regardless of the cholesterol content of the diet. This correspondence of estimates was not obtained in the bile-diverted dogs. It is suggested that the accelerated rate of cholesterol synthesis in these animals caused the defect in the isotopic estimates. Gross and microscopic morphology of all organs and tissues was examined. Abnormal findings were limited to the biliary tract and the urinary collecting system of the 2 bile-diverted dogs. Multiple bilirubinate gallstones were found, and mild pyelitis and ureteritis were present on the side of the bilio-renal shunt, but the urinary bladder was normal. Histologic evidence of moderate degree of cholangitis was found in 1 of the 2 bile-shunted dogs, but in neither dog was there evidence of impedance of bile flow.

0032 EFFECT OF FENFLURAMINE ON THE INTESTINAL ABSORPTION OF TRIGLYCERIDES.

(E.) Bizzi, A.; Veneroni, E.; Garattini, S. (Inst. Pharmacol. Res., Milan, Italy). *Eur. J. Pharmacol.* 23(2):131-136, 1973.

Fenfluramine (20 mg/kg, i.p.) markedly decreased plasma triglycerides in fed male Sprague-Dawley rats but not in fasted rats. When this compound was administered to rats in a post-absorptive state, a diminution in lymphatic flow and in triglyceride concentration was observed. Moreover, pretreatment with fenfluramine inhibited a rise in plasma and lymph triglycerides, normally found after an olive oil load (20 mg/kg). No alterations were noted in the flow rate and density of bile. The motility of the small intestine was considerably decreased. In fed rats receiving fenfluramine, no change was observed in plasma cholesterol and phospholipids. These data suggest that the lowering of plasma triglycerides, elicited by fenfluramine, is at least partially due to inhibition of the intestinal absorption of triglycerides.

0033 REGULATION OF CHOLESTEROL METABOLISM IN THE DOG. I. EFFECTS OF COMPLETE BILE DIVERSION AND OF CHOLESTEROL FEEDING ON ABSORPTION, SYNTHESIS, ACCUMULATION, AND EXCRETION RATES MEASURED DURING LIFE.

(E.) Pertsemlidis, D.; Kirchman, E. H.; Ahrens, Jr., E. H. (Mt. Sinai Sch. Med., New York, N.Y.). *J. Clin. Invest.* 52(9):2353-2367, 1973.

A 3-yr study of 6 adult pedigreed dogs was conducted to determine the effects of cholesterol feeding and bile diversion on cholesterol absorption, synthesis, and storage. These measurements were based on cholesterol balance and isotope kinetic studies. In the 6 dogs with undisturbed enterohepatic circulations fed a "cholesterol-free" diet, the rate of cholesterol synthesis ranged from 225-508 mg/day. In 2 dogs studied subsequently on cholesterol-containing diets, absorption of cholesterol was 71-94% on a dietary intake of 0.5 g/day; on high cholesterol intakes (2.7-3.0 g/day) the rate of absorption dropped to 43-51% of daily intake, but the absolute amounts absorbed increased. Cholesterol feeding caused accelerated bile acid formation and excretion, as well as nearly total inhibition of cholesterol synthesis. These 2 compensatory mechanisms were sufficient to maintain zero balance of cholesterol when cholesterol intake was higher. Plasma cholesterol concentrations in the 2 dogs increased 37 and 44%. In 2 other dogs bile was completely diverted into the urinary system for nearly 2 yr. When these dogs were put on a cholesterol-free diet, the sum of acidic steroids excreted daily in urine plus neutral steriods excreted in feces was 7 times higher than before surgery. Since these massive excretory losses could not have been sustained by mobilization from tissue cholesterol pools, and since the rate of disappearance of $[4-^{14}C]$cholesterol from the plasma after single i.v. injection was greatly increased after complete biliary diversion, total daily synthesis of cholesterol must have been greatly accelerated, for synthesis was totally unsuppressed. The increased output of fecal neutral steroids could result from transfer of plasma cholesterol across the gut wall or from increased synthesis in the gut. Plasma cholesterol levels were reduced in these 2 dogs by 20 and 27%, and triglycerides decreased by 36 and 43%. Accumulation of cholesterol in body pools in the cholesterol-fed dogs was apparently prevented, according to antemortem measurements. Increased absorption of dietary cholesterol was exactly balanced by suppression of cholesterol synthesis and enhanced bile acid excretion. In the bile-shunted animals antemortem measurements could not predict depletion of tissue stores of cholesterol.

0034 THE CONTRIBUTION OF SOLVENT DRAG TO THE INTESTINAL ABSORPTION OF TRITIATED WATER AND UREA FROM THE JEJUNUM OF THE RAT. *(E.)* Ochsenfahrt, H.; Winne, D. (Pharmacol. Inst., Univ. Tubingen, Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 279(2):133-152, 1973.

Hypotonic, isotonic, and hypertonic buffered solutions containing tritiated water or ^{14}C-labeled urea were perfused through jejunal loops of anesthetized male Wistar rats. The blood flow of the loop was maintained at (0.8-0.9 ml/min/g wet tissue weight). The water net flux was determined using polyethylene glycol as nonabsorbable marker and amounted to ± 30 µl/min/g. A positive water net flux (directed toward the blood) increased the absorption rates (disappearance rate from the intestinal lumen, appearance rate in the intestinal venous blood) of tritiated water and urea by 22 and 41%; a negative water net flux (directed toward the gut lumen) diminished it by 12 and 32%. The data were analysed by a kinetic model with the water net flux as independent variable. The water net flux influenced the absorption of solutes by interacting within the membranes and by changing the volume of blood flowing in the capillaries near the epithelium. This last effect is large for the absorption of the rapidly absorbable tritiated water, but small for the absorption of urea which is 10 times slower. The water net flux in the intestine depended linearly on the osmotic pressure difference between lumen and blood. The hydraulic permeability was 146-180 ml^2/min/g/osm.

0035 INTESTINAL FOLATE ABSORPTION. II. CONVERSION AND RETENTION OF PTEROYLMONOGLUTAMATE BY JEJUNUM. *(E.)* Olinger, E. J.; Bertino, J. R.; Binder, H. J. (Dept. Internal Med., Yale Univ., New Haven, Conn.). *J. Clin. Invest.* 52(9):2138-2145, 1973.

Studies were conducted to determine whether pteroylmonoglutamic acid (PGA) at physiologic concentrations is transported across the small intestine unaltered or is reduced and methylated to the circulating folate form (5-methyltetrahydrofolate [5-MeFH$_4$]) during absorption. [^{3}H]PGA was incubated *in vitro* on the mucosal side of the jejunum in male Sprague-Dawley rats. Of the folate transferred to the serosal side, the percent identified as 5-MeFH$_4$ by DEAE-Sephadex chromatography was inversely related to the initial mucosa PGA concentration: at 7, 20, and 2000 nm, 44%, 34%, and 2%, resp., was converted to 5-MeFH$_4$. However, less than 4% of the folate transferred across ileal mucosa was 5-MeFH$_4$ when the initial mucosa concentration was 20 nM. Specific activity of dihydrofolate (DHF) reductase, the enzyme responsible for converting PGA to tetrahydrofolic acid, was measured in villus homogenates and was significantly greater in the jejunum than in the ileum. PGA conversion to 5-MeFH$_4$ by the jejunum was markedly reduced by 1000 nM methotrexate (MTX), a DHF reductase inhibitor. Studies of transmural flux, initial rate of mucosal entry (influx) and mucosal accumulation (uptake) of folate were also performed. Although MTX did not alter the influx of PGA, MTX decreased jejunal mucosal uptake but increased transmural movement. Transmural folate movement across ileal mucosa was greater than across jejunal mucosa although mucosal uptake was greater in the jejunum than in the ileum. These results could explain the failure of previous studies to identify conversion of PGA to 5-MeFH$_4$ when intestinal preparations were exposed to higher and less physiologic concentrations of PGA. These studies also suggest that 5-MeFH$_4$ may be retained by the jejunal mucosa.

0036 THE INFLUENCE OF BLOOD FLOW ON THE ABSORPTION OF 3-O-METHYLGLUCOSE FROM THE JEJUNUM OF THE RAT. *(E.)* Lichtenstein, B.; Winne, D. (Pharmacol. Inst., Univ. Tubingen, Germany). *Naunyn Schmiedebergs Arch. Pharmakol.* 279(2):153-172, 1973.

Jejunal loops of anesthetized male Wistar rats were perfused (single pass perfusion and recirculation) with buffered solutions containing 3-O-methylglucose in 2 concentrations: below (30 µM) and above (30 mM) blood glucose concentration. The blood flow, the appearance rate in the intestinal venous blood, and the disappearance rate from the intestinal lumen were determined simultaneously, the accumulation in the gut wall at the end of the experiments. The appearance rate and disappearance rate decreased with time at constant intermediate blood flow. A decrease of the blood flow rate from 1.8-0.3 ml/min/g diminished the appearance and disappearance rate. An increase of blood flow from 0.3 to 1.9 ml/min/g caused no increase of absorption; even a slight decrease was observed. A kinetic analysis showed that the different blood flow dependence of 3-O-methylglucose absorption in the experiments with increasing and decreasing blood flow can be explained by a decrease of transport capacity with time, probably due to altered regional blood flow (decreased villous blood flow rate, unchanged total rate). A postischemic inhibition of 3-O-methylglucose absorption was of less importance. The increase in perfusion rate from 0.1 (single pass perfusion) to 10 ml/min (recirculation) increased 3-O-methylglucose absorption and tissue accumulation.

0037 PHENFORMIN-INDUCED ALTERATIONS OF SMALL INTESTINAL FUNCTION AND MITOCHONDRIAL STRUCTURE IN MAN. *(E.)* Arvanitakis, C.; Lorenzsonn, V.; Olsen, W. A. (VA Hosp., Madison, Wis.). *J. Lab. Clin. Med.* 82(2):195-200, 1973.

Jejunal absorption rates of glucose, water, and sodium were measured with a segmental perfusion technique in human volunteers before and 75 min after administration of phenformin (100 mg). Mean glucose absorption was reduced from 4,532 µM/hr/segment to 2,341; water absorption from 228 ml/hr/segment to -25; and sodium absorption from 1,700 µEq/hr/segment to 400. Although mucosal biopsies appeared normal by light microscopy, electron microscopy revealed disappearance of mitochondrial matrix granules in villus absorptive cells after the drug. It is suggested that the diminished rates of active intestinal transport is the consequence of mitochondrial injury with phenformin and an important mechanism of action of the drug in man. The results of these experiments indicate that phenformin substantially reduces the rate at which carbohydrate is absorbed. It is not certain if this decrease benefits the diabetic patient, but it certainly does affect the glucose tolerance test, one of the major criteria of success in management of these patients.

0038 FAT ABSORPTION IN ESSENTIAL FATTY ACID DEFICIENCY: A MODEL EXPERIMENTAL APPROACH TO STUDIES OF THE MECHANISM OF FAT MALABSORPTION OF UNKNOWN ETIOLOGY.

(E.) Clark, S. B.; Ekkers, T. E.; Singh, A.; Balint, J. A.; Holt, P. R.; Rodgers, Jr., J. B. (St. Luke's Hosp., Ctr., New York, N.Y.). *J. Lipid Res.* 14(5):581-588, 1973.

Male Sprague-Dawley rats were given a fat-free diet supplemented with 4% tripalmitin for 8-12 wk from the time of weaning, causing deficiency in essential fatty acids. After feeding 0.5 ml of [^{14}C]triolein or [^{3}H]oleic acid, 72-hr stool recoveries of radioactivity were significantly greater in deficient than in chow-fed rats. The absorptive capacities for triolein or for a medium-chain fat, trioctanoin, measured after 3 and 2 hr of maximal-rate duodenal infusion were not reduced by this deficiency. In everted jejunal slices from essential fatty acid-deficient rats, uptake of micellar [^{14}C]oleic acid at 0-1 C was similar to that of controls. However, the rate of incorporation of fatty acid into triglyceride after rewarming to 37 C was significantly reduced. In essential fatty acid-deficient rats, the specific activities of the microsomal esterifying enzymes acyl coenzyme A (CoA):monoglyceride acyltransferase and fatty acid CoA ligase in jejunal mucosa were 30% lower. However, the total microsomal enzyme activity adjusted to constant weight did not differ significantly in deficient compared with control rats. After intraduodenal perfusion of triolein, accumulation of lipid in the intestinal wall was increased in the deficient rats. Since more than 90% of the absorbed mucosal lipid was present as triglyceride, it is proposed that essential fatty acid deficiency affects the synthesis or release of chylomicron lipid from the intestine. This transport delay was most marked in the midportion of the small intestine.

0039 INTESTINAL TRANSPORT OF TWO DIPEPTIDES CONTAINING THE SAME TWO NEUTRAL AMINO ACIDS IN MAN.

(E.) Silk, D. B. A.; Perrett, D.; Clark, M. L. (St. Bartholomew's Hosp., London, England). *Clin. Sci. Mol. Med.* 45(3):291-299, 1973.

A double lumen perfusion technique has been used to study the absorption of the neutral amino acids glycine and L-alanine from the dipeptides L-alanylglycine and glycyl-L-alanine, and from an equivalent amino acid mixture in man. Glycine was absorbed faster from the dipeptides than from the equivalent amino acid mixture. The difference in absorption rates of glycine and alanine seen when the equimolar mixture of the amino acids was perfused was abolished when either dipeptide was perfused, suggesting that the mechanism of dipeptide uptake by the mucosal cell is independent of the amino acid-transport system. The presence of free amino acids in the lumen during perfusion of both dipeptides suggests that hydrolysis occurs at some stage in the uptake process. Intraluminal hydrolysis was not sufficient to account for the concentration of the amino acids seen. Their presence is perhaps due to hydrolysis of the dipeptides at the brush border. It is suggested that at least 2 modes of peptide absorption occur simultaneously: direct peptide uptake and peptide hydrolysis with subsequent absorption of the released amino acids by the amino acid transport system.

0040 IN VITRO IRON ATTACHMENT TO THE INTESTINAL BRUSH BORDER. EFFECT OF IRON STORES AND OTHER ENVIRONMENTAL FACTORS.

(E.) Kimber, C. L.; Mukherjee, T.; Deller, D. J. (Dept. Med., Univ. Adelaide, Australia). *Am. J. Dig. Dis.* 18(9):781-791, 1973.

Iron attachment to brush border membrane of guinea pig small intestine was measured by an *in vitro* technique. Both inorganic and hemoglobin iron uptake was assessed under various conditions. Electron microscopic and biochemical studies showed that iron was adsorbed to the glycocalyx of the brush border membranes. Dropping the incubation temperature below 37 C caused a progressive reduction in iron attachment. Anaerobic conditions did not significantly affect iron attachment. In iron-deficient animals attachment of both inorganic and hemoglobin iron was increased. Iron attachment was selective depending on the iron stores of the animal. Several iron-binding compounds reduced the uptake of inorganic iron when they were added at the beginning of the incubation period and did not affect attachment of hemoglobin iron. Gastric juice markedly increased attachment of heme iron to the pellet. This effect appeared related to the effect of acid on the hemoglobin molecule.

0041 CONTROL OF CALCIUM ABSORPTION AND INTESTINAL CALCIUM-BINDING PROTEIN SYNTHESIS.

(E.) Bar, A.; Wasserman, R. H. (New York State Vet. Coll., Ithaca). *Biochem. Biophys. Res. Commun.* 54(1):191-196, 1973.

Dihydrotachysterol (DHT; 600 IU i.m. every 3 days), a steroid which does not require 1-hydroxylation for biological activity, was given to day-old White Leghorn cockerels fed a diet which contained no vitamin D$_3$ (30 IU i.m. every 3 days). After 13 days, these 2 groups of chicks were each divided into 3 subgroups which were fed either a control diet (1.05% Ca, 0.75% P), a low-calcium diet (0.1% Ca, 0.75% P), or a low-phosphorus diet (1.05% Ca, 0.36% P). Measurements made on day 23 showed that duodenal ^{47}Ca absorption and the duodenal concentration of calcium-binding protein were significantly higher in vitamin D$_3$-treated chicks fed the low-calcium and low-phosphorus diets than in DHT-treated chicks receiving these diets. DHT-treated chicks were unable to adapt to a low calcium intake, but they did partially adapt to the low-phosphorus diet since ^{47}Ca absorption and calcium-binding protein levels were significantly higher than in the DHT-treated controls. These results are not consistent with the hypothesis that regulation of calcium absorption is mediated by increased synthesis of 1,25-dihydroxycholecalciferol by 1-hydroxylase in the kidney. They indicate an alternate pathway of control.

0042 OBSERVATIONS UPON AMMONIA ABSORPTION FROM THE HUMAN ILEUM. *(E.)* Swales, J. D.; Papadimitriou, M.; Wrong, O. M. (Roy. Infirm., Manchester, England). *Gut* 14(9):697-700, 1973.

Ammonia absorption from the human ileum was observed in a 27-yr-old man with renal failure due to chronic pyelonephritis secondary to a neurogenic bladder which had followed spinal injury. A double ballooned Foley-type catheter was placed so that one balloon was inside the pouch, and the other just outside; the ileal stoma was thus occluded. All solutions contained 1.25 g of polyethylene glycol. To prepare the solution, 0.2 M Tris was titrated to pH 7.0 or pH 8.0 with 0.1 N hydrochloric acid. Ammonium chloride (75 mEq/liter) and hydrazine (400 μg/liter) were added, together with sodium chloride to made the solution isotonic. When isotonic saline was instilled into the ileal sac, the fluid recovered contained insignificant amounts of ammonia (less than 0.5 mEq/liter). The addition of ammonium chloride to the buffered solutions resulted in a slight lowering of pH so that the mean final pH of the two buffered solutions of ammonium chloride was 6.85 and 7.72. The mean absorption of ammonia was 25.0% from the more acid of these solutions and 44.1% from the solution of higher pH. The pH 6.85 solution contained significantly less bicarbonate than the solution buffered at pH 7.72. Significantly more hydrazine was absorbed from the solution buffered at 7.72 than from the solution buffered at 6.85. These results suggest that nonionic diffusion plays an important role in ammonia absorption from the human ileum.

0043 SMALL INTESTINAL PERMEABILITY IN ANIMALS AND MAN. *(E.)* Loehry, C. A.; Kingham, J.; Baker, J. (Roy. Victoria Hosp., Bournemouth, England). *Gut* 14(9):683-688, 1973.

Small intestinal permeability was studied in 12 humans and in albino rabbits. The clearances of urea, uric acid, creatinine, and ^{68}CO vitamin B12 into a segment of duodenum were studied through a triple lumen tube, screened into the 3rd and 4th parts of the duodenum. There is a direct relationship between the levels of urea in the intestinal lumen and the blood. A similar relationship was established for the other substances. Molecular weight varied from 60-80,000. The smaller molecules are cleared at a much faster rate than the larger ones. ^{125}I-labeled polyvinylpyrrolidone (PVP 50 μC) was injected i.v. into 6 patients with no evidence of gastrointestinal disease. Blood was taken 30 minutes after injection and the stools were collected over the next 4 days. Radioactivity increased in the smaller molecular weight fractions in the feces. There is a progressive rise in intestinal clearance with a fall in molecular size. Perfusions of jejunal and ileal segments of rabbits were performed at the rate of 350 ml/hr. The test mixture was composed of 8 g urea, 3 g creatinine, 40 μC of ^{125}I PVP, and 3 μC of ^{57}CO vitamin B12 in 15 ml of normal saline. The perfusate levels of the substances rose concomitantly with an increasing blood level, though the levels in the jejunal segment were always higher than in the ileal. The clearances in jejunum and ileum remained constant over the range of plasma levels studied. The proportionate fall in clearance in all the substances in the ileum remained constant for all the substances with molecular size ranging from 60-40,000. The intestine was perfused in 4-in. segments. With all the substances, there was a fall from the proximal to the distal intestine, the greatest fall occurring in the first 40 in. and then to a lesser extent in the last 40 in. Short 2-in. segments of duodenum and jejunum were cannulated and perfused at a rate of 600 ml/hr. The peak excretion of all the substances was rapidly reached in 1 1/2 to 2 min after injection. Molecular size made no difference to the speed with which the molecules permeated the mucosal barrier.

0044 THE ROLE IN CHYLOMICRON FORMATION OF PHOSPHOLIPASE ACTIVITY OF INTESTINAL GOLGI MEMBRANES. *(E.)* Redgrave, T. G. (Dept. Physiol., Univ. Melbourne, Parkville, Australia). *Aust. J. Exp. Biol. Med. Sci.* 51(4):427-434, 1973.

The role in chylomicron formation of phospholipase activity of intestinal Golgi membranes was studied in female albino rats. Isolated intestinal cells were prepared from rats that had been given 1 ml of 2% cholesterol in corn oil. The prechylomicrons contain significant lipolytic activity toward both phospholipids and triglycerides. The specific activity compared on a protein basis is uniformly higher than similar activities which are present in the whole intestinal cell homogenate. Phospholipase activity shows a broad pH optimum around pH 6 in either cacodylate or piperazine-glycylglycine buffer. Activity decreases markedly above pH 8. Triglyceride lipase activity is maximal at pH 8.0-8.5 in piperazine-glycylglycine buffer. Triglyceride and phospholipid hydrolysis at optimum pH are fairly sensitive to heating and both are severely inhibited by Triton X-100. It is suggested that phospholipase and triglyceride lipase activities are implicated in transport of prechylomicrons out of the intestinal cell.

0045 THE PERMEABILITY OF THE SMALL INTESTINAL MUCOSA: A STUDY USING IRON.

(E.) Loehry, C. A.; Parish, D.; Baker, J. (Roy. Victoria Hosp., Bournemouth, England). *Gut* 14(10):773-777, 1973.

Solutions of ferrous and ferric sulfate (4 g in 15 ml saline), iron sorbitol/ascorbic acid and dextran iron complex were injected into the lumen of the small intestine in albino rabbits and into the mesenteric arterial supply. Sections of the mucosa were stained for ferric ions by immersing for 30 minutes into equal parts of 2% HCl and 2% potassium ferrocyanide (Prussian Blue reaction). Both ferric and ferrous sulfate showed staining as the mucosa is known to convert rapidly the ferrous ion to the ferric form. The ferric ion is bound to various cell structures and its passage through the mucosa could therefore be demonstrated. Iron appeared to pass from the blood into epithelial cells, especially near the tips of the villi, and also between cells as far as the junctional membrane. Studies using ^{59}Fe demonstrated the rapidity of transfer of iron from the blood into the intestinal lumen. After a period of ischaemia epithelial cells in other situations also appeared permeable to iron. Iron sorbitol/ascorbic acid and dextran iron complex did not show staining, presumably because the bound molecule had less affinity for tissue constituents, and also because the mucosa is less permeable to these molecules of larger molecular sizes.

0046 ABSORPTION OF AMINO ACIDS FROM AN AMINO ACID MIXTURE SIMULATING CASEIN AND A TRYPTIC HYDROLYSATE OF CASEIN IN MAN.

(E.) Silk, D. B. A.; Marrs, T. C.; Addison, J. M.; Burston, D.; Clark, M. L.; Matthews, D. M. (Westminster Med. Sch., London, England). *Clin. Sci. Mol. Med.* 45(5): 715-719, 1973.

A double-lumen perfusion technique was used in normal male volunteers to study jejunal absorption of individual amino acids from an amino acid mixture simulating casein and a tryptic hydrolysate of casein consisting of oligopeptides and amino acids. Total absorption was greater from the tryptic hydrolysate (62.4%) than from the amino acid mixture. There was wide variation in the extent to which individual amino acids were absorbed from the amino acid mixture. This was decreased when the tryptic hydrolysate was perfused. Amino acids which were poorly absorbed from the amino acid mixture were absorbed to a substantially greater extent from the tryptic hydrolysate and this was significant for phenylalanine, lysine, glutamic acid, alanine, histidine, and aspartic acid. The results suggest that the characteristics of absorption of amino acid mixtures do not represent those of absorption of the physiological products of intraluminal digestion, oligopeptides and amino acids.

0047 EFFECTS OF CHOLESTYRAMINE, METAMUCIL, AND CELLULOSE ON FECAL BILE SALT EXCRETION IN MAN.

(E.) Stanley, M. M.; Paul, D.; Gacke, D.; Murphy, J. (Abraham Lincoln Sch. Med., Chicago, Ill.). *Gastroenterology* 65(6):889-894, 1973.

Fecal excretion of ^{14}C-cholate was estimated 32 times (16-day studies) in 22 normal subjects. Each subject ate a constant diet (2-day rotation) closely resembling his usual fare. During the third and fourth (4-day) periods, the effects of medications, randomly assigned, administered double blind, in dosages of 15 g per day, were compared with those of methyl cellulose administered during the control period. Methyl cellulose does not increase bile salt excretion but increases the masses of intestinal contents and stools as do the comparison medications. Excretion rates during periods 3 and 4 are compared with the excretion rate during period 2, the control period. Cholestyramine, Metamucil (psyllium hydrophilic mucilloid), cellulose (15 g/day), and cellulose (30 g/day) all increased excretion rates. In direct comparisons in the same subjects cholestyramine increased the excretion rate over 15 g of cellulose. Metamucil and cellulose increase bile salt excretion slightly but significantly; the effect of cholestyramine is several times as great. However, Metamucil and cellulose resemble frequently ingested food components which may be important determinants of "spontaneous" variations in bile salt turnover.

0048 THE HYDROLYSIS OF GLYCINE OLIGOPEPTIDES BY GUINEA-PIG INTESTINAL MUCOSA AND BY ISOLATED BRUSH BORDERS.

(E.) Peters, T. J.; (Roy. Postgraduate Med. Sch., London, England). *Clin. Sci. Mol. Med.* 45(6):803-816, 1973.

The relative rates of hydrolysis of a series of glycine homopeptides by guinea-pig small intestinal mucosa and by isolated brush borders were studied. Oligopeptides up to and including hexaglycine were hydrolysed. No activity was detected against a series of homopolypeptides of molecular weight 10,000-100,000. Except for activity against diglycine, the peptidase activity was greater in the brush-border fraction than in the original homogenate. The relative activity of the peptidase in the brush borders compared to the homogenate increased with increasing length oligopeptide substrate. Analysis of the enzyme reaction products indicated that the brush border contained an exopeptidase. Studies with peptide derivatives containing *N*- and *C*-terminal blocking groups, and with tetraglycine synthesized with either the *N*- or *C*-terminal residues labelled, demonstrated that the brush borders contained an amino-oligopeptidase. Studies with inhibitors and with purified gastric and pancreatic enzymes indicated that this glycine oligopeptidase activity was not due to enzymes from the intestinal lumen which had been adsorbed to the brush borders.

0049 EXTRACTION OF CIRCULATING ENDOGENOUS GASTRIN BY THE SMALL BOWEL.

(E.) Becker, H. D.; Reeder, D. D.; Thompson, J. C. (Univ. Texas Med. Branch, Galveston). *Gastroenterology* 65(6):903-906, 1973.

The concentrations of gastrin was measured by radioimmunoassay in the aorta and the superior mesenteric vein of 8 adult dogs. During the basal period there was no difference between the arterial and venous serum concentration of gastrin. After elevation of the gastrin levels by stimulation of the antrum with 0.1% acetycholine (150 ml/hr), 43% of endogenous gastrin was lost during transit of the small bowel. A threshold level for the uptake of gastrin by the small intestine is suggested. Loss of catabolic mechanisms for gastrin may be responsible, at least in part, for gastric acid hypersecretion seen frequently after massive resection of the small bowel.

0050 INHIBITION OF COLONIC WATER AND ELECTROLYTE ABSORPTION BY FATTY ACIDS IN MAN.

(E.) Ammon, H. V.; Phillips, S. F. (Mayo Clin., Rochester, Minn.). *Gastroenterology* 65(5):744-749, 1973.

The colon of 9 healthy volunteers was perfused with isotonic electrolyte solutions with or without 2 mM concentrations of three C_{18} fatty acids. These were oleic acid, its bacterial by-product 10(9)-hydroxystearic acid, and ricinoleic acid, the active principle of castor oil. Hydroxystearic and ricinoleic acids reduced electolyte and water absorption by more than 50%. These results suggest that C_{18} fatty acids may contribute to diarrhea in states of fat malabsorption by impairing intestinal water absorption. In addition, hydration of dietary fats of hydroxy fatty acids may not be essential for this effect. During perfusion, the three fatty acids were absorbed by the human colon to the same extent.

0051 RELATIONSHIPS BETWEEN ION AND WATER MOVEMENT IN THE HUMAN JEJUNUM, ILEUM AND COLON DURING PERFUSION WITH BILE ACIDS.

(E.) Wingate, D. L.; Krag, E.; Mekhjian, H. S.; Phillips, S. F. (London Hosp. Med. Coll., England *Clin. Sci. Mol. Med.* 45(5):593-606, 1973.

The relationships between ion and water movement in the jejunum, ileum and colon during perfusion with bile acids were studied in 11 healthy volunteers. Perfusion of the human jejunum with low concentrations of glycine-conjugated bile acids in physiological solutions induced net fluid flow that varied between absorption and secretion, with only slight variation of the luminal osmotic and ionic milieu. Regression analysis of the transmucosal net flux rates for water and the principal ions was consistent with the concept of a 'net transported fluid' which was isosmotic with respect to the lumen, with a superimposed fixed net anion exchange unaffected by the rate or direction of bulk flow. Recalculation of earlier data from comparable studies of the human colon showed similar relationships consistent with varying isosmotic bulk flow and fixed ion exchange, the latter differing from that found in the proximal bowel. Studies in the human ileum indicated variable isosmotic bulk flow, but ion exchange was of a lower magnitude than in the jejunum or colon. Qualitatively, ion exchange in the ileum was intermediate between the jejunum and colon. These analyses suggest that transmucosal bulk flow and ion exchange may be quantitatively and spatially independent processes. They provide support for the hypothesis that bulk flow may be intercellular (and hence extracellular), while ion exchange may take place across the luminal face of the mucosal cell.

0052 THE DISTRIBUTION OF ABSORBED ^{3}H-PALMITIC ACID IN THE INTESTINAL VILLI OF THE CAT DURING VARIOUS CIRCULATORY CONDITIONS.

(E.) Jodal, M.; Lundgren, O. (Dept. Physiol. Univ. Goteborg, Sweden). *Acta Physiol. Scand.* 89(3):318-326, 1973.

The distribution of absorbed ^{3}H-palmitic acid within the villous tissue of 20 cats was investigated by determining the amount of radioactivity/unit weight tissue protein in 40-60 μm thick tissue slices cut perpendicular to the long axis of the villi. A bile solution containing the tracer was incubated in the intestinal lumen for 1 min during *in vivo* conditions. At resting blood flow a steep gradient of radioactivity along the villous length was observed, the highest amount of tracer being found at the tip. This gradient was less steep if the experiments were performed during total intestinal ischemia. The tissue content of ^{3}H-palmitic acid could be markedly decreased by intense vasodilatation or by placing a 7% albumin solution on the "luminal" surface of the intestinal epithelial cells, after removing the bile solution containing the tracer. The serum albumin, continuously circulating at the "tissue" surface of the epithelial cells, was far less efficient in lowering tissue content of radioactivity. It is proposed that the results of the present investigation are explained by a trapping of the palmitic acid in the intestinal countercurrent exchanger efficiently hindering net blood absorption of the fatty acid.

0053 AN AUTORADIOGRAPHIC STUDY OF THE INTESTINAL ABSORPTION OF PALMITIC AND OLEIC ACID.

(E.) Haglund, U.; Jodal, M.; Lundgren, O. (Dept. Physiol Univ. Goteborg, Sweden). *Acta Physiol. Scand.* 89(3):306-317, 1973.

The distribution of intraluminally incubated long-chain fatty acids (LFA; ^{3}H-palmitic acid, ^{3}H-oleic acid) within the intestinal villi were studied in 25 cats during *in vivo* conditions with an autoradiographic technique which prevented tracer losses from the tissue. LFA are fairly diffusely localized throughout the whole epithelial cell and, to some extent, also in the lamina propria after 1 or 20 min incubation. Intense vasodilatation or a 7% albumin solution administered intraluminally after the tracer incubation is able to extract a large amount of the absorbed LFA from the epithelial cells. It is suggested that LFA enter the epithelial cells faster than they are re-esterified into triglycerides, resulting in a pool of diffusible LFA within the cells. Although the cells are in close contact with the sub-epithelial capillary network, any subsequent rapid absorption *via* the blood stream does not occur. It is proposed that the hindrance to net blood absorption of the lipid-soluble LFA is a short circuiting of the easily diffusible LFA in the mucosal countercurrent exchanger.

0054 THYROCALCITONIN AND THE JEJUNAL ABSORPTION OF CALCIUM, WATER AND ELECTROLYTES IN NORMAL SUBJECTS. *(E.)* Gray, T. K.; Bieberdorf, F. A.; Fordtran, J. S. (Univ. North Carolina Med. Sch., Chapel Hill). *J. Clin. Invest.* 52(12): 3084-3088, 1973.

Jejunal absorption of calcium, water and electrolytes was measured in 10 normal subjects by the triple-lumen perfusion method. During the control period, water and electrolyte movements were minimal when a bicarbonate-free test solution was infused. By contrast, bicarbonate-containing solutions were readily absorbed in the control period. I.v. infusion of synthetic salmon calcitonin (SCT) (1 Medical Research Council U/kg/wt/hr) over 110-120 min resulted in a marked jejunal secretion of water, sodium, potassium and chloride in 8 of the 10 subjects. This jejunal secretion occurred with both the bicarbonate-free and the bicarbonate-containing test solutions. Calcium absorption was not affected by SCT, and the serum calcium concentration did not fall during SCT infusion. These results suggest that diarrhea in patients with medullary carcinoma of the thyroid may be due to intestinal secretion secondary to high blood concentrations of thyrocalcitonin.

0055 THE ABSORPTION OF THE DIASTEREOISOMERS OF 5-METHYLTETRAHYDROPTEROYLGLUTAMATE IN MAN: A CARRIER-MEDIATED PROCESS. *(E.)* Weir, D. G.; Brown, J. P.; Freedman, D. S.; Scott, J. M. (Sir Patrick Dun's Hosp., Dublin, Ireland). *Clin. Sci. Mol. Med.* 45(5):625-631, 1973.

The human absorption of the diastereoisomers of 5-methyltetrahydropteroylglutamate (5CH$_3$H$_4$PteGlu) was studied. Informed volunteers were injected with 15 mg of PteGlu 24 hr before the test. The test solution (300 μg) ^{3}H-labelled active diastereoisomer), was taken by mouth in 100 ml of water and washed down with a further 200 ml of water. A flushing dose of 15 mg of PteGlu was given parenterally 15 min after the test dose and the urine was collected for 24 hr. A second study was performed during the next 24 hr with the alternate, inactive diastereoisomer. Five normal subjects with no gastrointestinal, hematological, or urinary disease and 4 adult untreated celiac patients were used. After oral administration of the active diastereoisomer, a mean excretion of 43.25% was observed, whereas the inactive diastereoisomer gave a mean excretion of 22.5%. There was no significant difference in the celiac patients. The absorption of the active diastereoisomer was significantly higher in the control groups than in the celiac patients. After i.v. administration of the active diastereoisomer, 50% was collected in the first 24 hr urine collection. However, the entire administered dose (104%) of the inactive diastereoisomer was collected over the same period. These results show that in man the reduced biologically active folate is preferentially reabsorbed by the kidneys and/or taken up by the body tissue stores. Since the 2 diastereoisomers are chemically inseparable, the preferential treatment of the active form appears to involve a carrier-mediated process.

0056 FOOD IRON ABSORPTION IN MAN. II. ISOTOPIC EXCHANGE OF IRON BETWEEN LABELED FOODS AND BETWEEN A FOOD AND AN IRON SALT. *(E.)* Bjorn-Rasmussen, E.; Hallberg, L.; Walker, R. B. (Dept. Med., Goteborg, Sweden). *Am. J. Clin. Nutr.* 26(12): 1311-1319, 1973.

0057 EFFECT OF INSULIN AND EXPERIMENTAL DIABETES MELLITUS ON THE DIGESTIVE-ABSORPTIVE FUNCTION OF THE SMALL INTESTINE. *(E.)* Caspary, W. F. (Dept. Med., Univ. Gottingen, Germany). *Digestion* 9(3):248-263, 1973.

0058 THE METHOD OF INTRALUMINAL PERFUSION OF THE HUMAN SMALL INTESTINE. *(E.)* Modigliani, R.; Rambaud, J. C.; Bernier, J. J. (Hosp. Saint-Lazare, Paris, France). *Digestion* 9(3):264-290, 1973.

0059 THE EFFECT OF REDUCED PERFUSION PRESSURE AND REGIONAL SYMPATHETIC VASOCONSTRICTOR ACTIVATION ON THE RATE OF ABSORPTION ^{85}Kr FROM THE CAT. *(E.)* Svanvik, J. (Dept. Physiol., Univ. Goteborg, Sweden). *Acta Physiol. Scand.* 89(2):239-248, 1973.

0060 THE INFLUENCE OF BLOOD FLOW ON THE RATE OF ABSORPTION OF ^{85}Kr FROM THE SMALL INTESTINE OF THE CAT. *(E.)* Biber, B.; Lundgren, O.; Svanvik, J. (Dept. Physiol., Univ. Goteborg, Sweden). *Acta Physiol. Scand.* 89(2):227-238, 1973.

0061 OUABAIN ACTION ON SODIUM, CHLORIDE AND FLUID TRANSPORT IN RABBIT JEJUNUM AND ILEUM. *(E.)* Giordana, B.; Repetto, F.; Bianchi, A. (Inst. Physiol., Univ. Milan, Italy). *Experientia* 29(10):1243-1244, 1973.

0062 EFFECT OF INTRAARTERIAL VASOPRESSIN ON CANINE GASTRIC MUCOSAL PERMEABILITY. *(E.)* Dorricott, N. J.; Eisenberg, H.; Silen, W. (Dept.

Surg., Beth Israel Hosp., Boston, Mass.). *Gastroenterology* 65(4):625-629, 1973.

0063 CONGENITAL DISORDERS OF VITAMIN B_{12} TRANSPORT AND THEIR CONTRIBUTION TO CONCEPTS. *(E.)* Hall, C. A. (VA Hosp., Albany, N.Y.). *Gastroenterology* 65(4):684-686, 1973.

0064 THE RELATIONSHIP BETWEEN SODIUM FLUXES AND ELECTRICAL POTENTIALS ACROSS THE NORMAL AND INFLAMED HUMAN RECTAL WALL IN VIVO. *(E.)* Rask-Madsen, J. (Glostrup Hosp., Denmark). *Acta Med. Scand.* 194(4):311-317, 1973.

0065 THE EFFECT OF PAPAVERINE ON $^{45}Ca^{2+}$ UPTAKE IN PARTLY DEPOLARIZED TAENIA COLI OF THE GUINEA-PIG. *(E.)* Kadlec, O.; Masek, K.; Seferna, I. (Inst. Pharmacol., Prague, Czechoslovakia). *J. Pharm. Pharmacol.* 25:914-915, 1973.

0066 DIGESTION AND ABSORPTION OF DRY AND HIGH-MOISTURE MAIZE DIETS IN THE SMALL AND LARGE INTESTINE OF THE PIG. *(E.)* Holmes, J. H. G.; Bayley, H. S.; Horney, F. D. (Univ. Guelph, Ontario Canada). *Br. J. Nutr.* 30(3):401-410, 1973.

0067 THE SITE OF PROTEIN ABSORPTION FROM THE PERITONEAL CAVITY. *(E.)* Szabo, G.; Magyar, Z. (Natl. Inst. Traumatol., Budapest, Hungary). *Res. Exp. Med.* 161(4):335-338, 1973.

0068 THE ACTION OF HYDROXYUREA, 1,3 BIS(2-CHLOROETHYL)-1-NITROSOUREA (BCNU) AND NITROGEN MUSTARD ON GLUCOSE AND WATER ABSORPTION FROM THE SMALL INTESTINE OF THE RAT. *(E.)* Sapru, H.; Merker, P. C. (Coll. Pharm. Sci., Columbia Univ., New York, N.Y.). *Res. Commun. Chem. Pathol. Pharmacol.* 6(3):1101-1104, 1973.

0069 PERFUSION TECHNIQUE OF THE INTACT HUMAN RECTUM. *(E.)* Bechgaard, E. (Roy. Danish. Sch. Pharm., Copenhagen, Denmark). *Acta Pharmacol. Toxicol.* 33(2):123-128, 1973.

See also, 0690, 0740.

MOTILITY

0070 THE ACTION OF CAERULEIN ON GASTROINTESTINAL PROPULSION IN MICE. *(E.)* Piccinelli, D.; Ricciotti, F.; Catalani, A.; Sale, P. (Inst. Pharmacol., Univ. Rome, Italy). *Naunyn Schmiederbergs Arch. Pharmacol.* 279(1):75-82, 1973.

The effects of caerulein, a decapeptide amide present in the skin of *Hyla Caerulea* as well as other Australian Hylae, on the intestinal motility of Swiss mice were studied. A technique was adopted utilizing a photoluminescent pigment as a detector of the intestinal propulsion. Caerulein at doses of 1-5 µg/kg enhanced intestinal motility. Caerulein at doses of 20-40 µg/kg inhibited intestinal motility. A separation of the 2 effects was successful and it was determined that the enhancing effect was localized in the intestine, while the inhibitory effect was displayed at the gastric level.

0071 THE CONTINUOUS WITHDRAWAL METHOD FOR THE QUANTITATIVE ANALYSIS OF THE LOWER OESOPHAGEAL SPHINCTER (LES) IN HUMANS. *(E.)* Waldeck, F.; Jennewein, H. M.; Siewert, R. (C. H. Boehringer Sohn, Ingelheim, Germany). *Eur. J. Clin. Invest.* 3(4):331-337, 1973.

The continuous withdrawal method, successfully used in animal experiments for recording pressure profiles in the lower esophageal sphincter, was applied for the first time in human studies. A catheter with 4 side holes, serving as a pressure transmitter, was continuously withdrawn from the stomach at a constant speed (6 mm/sec) while constantly perfused (5 ml/min.). This procedure has numerous advantages, particularly for quantitative analysis, when compared to both the stepwise pull-through method and an open-side catheter lying stationary in the sphincter. The profiles obtained using the continuous withdrawal method are remarkable for their definition. Displacements are eliminated, and the pressure maximum can be definitely determined even if there is a shift in the area of maximum pressure. Pressure profiles of the lower esophageal sphincter taken with the withdrawal method in 20 conscious subjects usually showed a gradual, and then a more rapid increase from aboral to oral. After reaching a maximum value the profiles decreased steeply and changed into subzero pressures. The maximum pressure taken from the pressure profiles of 20 subjects, the mean value of all experiments, was 19 ± 7.3 mm Hg with a mean sphincter length of 3.4 ± 0.6 cm. The pressure profiles could be recorded at intervals as short as 0.5-2 min without appreciable irritation of the sphincter. The continuous withdrawal method was especially efficient, even after an increase of the sphincter tone induced by pentagastrin (0.6 µg/kg, i.v.). The mean results of the experiments in 6 test subjects showed the maximum pressure in the lower esophageal sphincter increased from 13 ± 6.3 mm Hg to 44.2 ± 11 mm Hg 1 min. after the injection and the mean sphincter length increased from 3.9 ± 1.2 cm to 5.3 ± 1.4 cm. These effects subsided after 7-10 min. Pressure profiles thus obtained, combined with supplementary measurements, indicated that pentagastrin shifts the maximum pressure area in the oral direction.

0072 ENHANCEMENT OF Ca-CONTRACTIONS BY CATECHOLAMINES AND TEMPERATURE DEPENDENCY IN THE DEPOLARIZED TEANIA COLI OF THE GUINEA PIG. *(E.)*

Ohashi, H.; Ohga, A.; Saito, K. (Fac. Vet. Med., Hokkaido Univ., Sapporo, Japan). *Jap. J. Pharmacol.* 23(4):467-477, 1973.

Guinea-pig taeniae coli suspended in a depolarizing solution without calcium responded to calcium by a contraction. The effects of adrenaline, noradrenaline, and isoprenaline on the contactile response were investigated at 20 C and at 37 C. Contractile response to calcium was not affected significantly by adrenaline and noradrenaline, but was reduced by isoprenaline at 37 C. At 20 C, all 3 catecholamines inhibited calcium-contraction. The sequence of potency in producing the inhibition was isoprenaline, adrenaline, noradrenaline, the same sequence as related to beta-receptor mediated responses. A beta-receptor blocking agent markedly reduced or abolished the inhibitory effects, and consequently the calcium-contraction was enhanced by adrenaline and noradrenaline at 37 C. An alpha-receptor blocking agent increased the inhibitory effects so that adrenaline and noradrenaline reduced the calcium-contraction at 37 C. The order of potency in producing the inhibition after alpha-receptor blockade was unchanged. It was concluded that the stimulatory effect is mediated by alpha-receptor activation and the inhibitory effect by beta-receptor activation. After beta-receptor blockade and at 37 C, adrenaline and noradrenaline applied after calcium caused further tension. The contractile response to adrenaline resembles the slow component of the actylcholine-induced contraction, regarding time course and susceptibility to removal of calcium from the extracellular medium. Adrenaline enhanced the calcium-contraction to the same extent before and after frequent exposures to acetylcholine to deplete cell-bound calcium. The enhancement of the calcium-contraction by adrenaline and noradrenaline may be dependent on increased permeation of calcium ions across the cell membrane.

0073 COLONIC MOTILITY IN THE CAT III. INFLUENCE OF HYPOTHALAMIC AND MESENCEPHALIC STIMULATION.

(E.) Rostad, H. (Inst. Neurophysiol., Univ. Oslo, Norway). *Acta Physiol. Scand.* 89(1):104-115, 1973.

Colonic motility was studied using sensitive extraluminal strain-gauge transducers in lightly anesthetized cats following electrical stimulation of hypothalamic and mesencephalic structures. Stimulation of various structures of the hypothalamus gave the following results. The sympatho-inhibitory area in the anterior hypothalamus increased colonic activity concomitantly with a fall in blood pressure. The ventral anterior and lateral hypothalamus produced excitatory colonic effects, usually associated with a rise in blood pressure. Similar effects were obtained from the dorsal part of the ventromedial hypothalamic nucleus. Stimulation of the ventral part of the hypothalamus, generally coinciding with the course of the medial forebrain bundle, and the ventral part of the ventromedial nucleus, resulted in inhibitory colonic effects. Stimulation of various structures of the mesencephelon gave the following results. The central gray substance, red nucleus, and reticular substance elicited increased colonic effects, most conspicuous in the proximal part of the colon, usually associated with a rise in blood pressure. Points within the central tegmental tract and the medial lemniscus resulted in inhibition of colonic motility.

0074 MODE OF ACTION OF CHOLECYSTOKININ AND RELATED PEPTIDES ON GALLBLADDER MUSCLE.

(E.) Yau, W. M.; Makhlouf, G. M.; Edwards, L. E.; Farrar, J. T. (Med. Coll. Virginia, Richmond). *Gastroenterology* 65(3):451-456, 1973.

The effect of cholecystokinin, octapeptide-cholecystokinin, caerulein, and pentagastrin on guinea pig gallbladder muscle contraction was investigated *in vitro*. Concentration-response curves were constructed for each peptide and shown to obey Michaelis-Menten type kinetics. Maximal responses were similar, indicating that the efficacies of all 4 peptides were equal. In this instance, therefore, the concentrations required to elicit a given (half-maximal) response could be held to represent molar potency. Accordingly, it was calculated that the octapeptide fragment of cholecystokinin and caerulein were, resp., 10 and 2 times more potent than cholecystokinin while pentagastrin was 1800 times less potent. Response could not be altered by anticholinergic, anti-adrenergic, and depolarizing agents, or tetrodotoxin, from which it was concluded that cholecystokinin and related peptides exerted their action directly on gallbladder muscle.

0075 CHARACTERIZATION OF ANGIOTENSIN RECEPTORS IN VASCULAR AND INTESTINAL SMOOTH MUSCLES.

(E.) Park, W. K.; Regoli, D.; Rioux, F. (Central Hosp., Univ. Sherbrooke, Canada). *Br. J. Pharmacol.* 48(2):288-301, 1973.

Analogues of angiotensin II (AT_{II}) were used to characterize receptors for AT_{II} in intestinal (rat stomach strip, rat colon) and vascular (rabbit aorta) smooth muscles. Two types of compounds were chosen: (a) agonists with reduced potency, in which 4-Tyr, 6-His, or 7-Pro had been substituted with L-Ala or with Gly and 1-aminocyclopentane carboxylic acid and (b) competitive antagonists (8-Gly-AT_{II}, 8-Leu-AT_{II}). Replacement of 4-Tyr, 6-His, and 7-Pro with L-Ala decreases the potency, but does not influence the maximum effect of the analogue, while substitution of the same residue with Gly and 1-aminocyclopentane carboxylic acid reduces both potency and maximum effect. Compounds showing full size maximum responses were chosen to establish the following order of potency on the three preparations: $AT_{II} > 4\text{-Phe-}AT_{II} > 7\text{-Ala-}AT_{II} > 6\text{-Ala-}AT_{II} > 4\text{-Ala-}AT_{II}$. The 4 derivatives of angiotensin II were inactive on tissues desensitized with AT_{II}. The responses to 5-hydroxytryptamine, acetylcholine, and noradrenaline were not significantly modified, except for the rat colon. pA_2 values for the 2 competitive antagonists against AT_{II} and 4-Phe-AT_{II} were estimated in the 3 preparations by the cascade superfusion technique. For comparison, pA_2 values were also estimated in rat stomach strips and rabbit aortas suspended in a normal organ bath. The similarities of the pA_2 values obtained in 2 series of experiments indicate that the cascade superfusion technique is suitable for this type of study and the receptor for AT_{II} in the 3 tissues may be the same. It is suggested that receptors for AT_{II} in intestinal and vascular smooth muscles may be identical, because the order of potency of various agonists follows the same pattern, the agonists are inactive on tissues desensitized with AT_{II}, and pA_2 values for competitive antagonists are similar in the 3 preparations.

0076 MOTOR RESPONSES OF THE SIGMOID COLON AND RECTUM TO EXOGENOUS CHOLECYSTOKININ AND SECRETIN. *(E.)* Dinoso, Jr., V. P.; Meshkinpour, H.; Lorber, S. H.; Gutierrez, J. G.; Chey, W. Y. (Temple Univ. Health Sci. Ctr., Philadelphia, Pa.). *Gastroenterology* 65(3):438-444, 1973.

The effects of exogenous cholecystokinin and secretin on motor activity of the sigmoid colon and rectum were studied in 10 subjects (5 males and 5 females aged 22-68 yr). Cholecystokinin (0.5-2.0 U/kg/hr, i.v.) stimulated and secretin (0.5-2.0 U/kg/hr, i. v.) inhibited basal motor activity of the sigmoid, as measured by intraluminal pressure changes. In addition, cholecystokinin-induced motor activity of the sigmoid colon was inhibited by secretin. Neither cholecystokinin nor secretin influenced motor activity of the rectum.

0077 THE ELECTRICAL AND MOTOR ACTIONS OF GASTROINTESTINAL HORMONES ON THE DUODENUM IN MAN. *(E.)* Waterfall, W. E.; Duthie, H. L.; Brown, B. H. (Dept. Surg., Univ. Sheffield, England). *Gut* 14(9):689-696, 1973.

Electrical and motor activity was recorded from the duodenum in 16 conscious human subjects in resting conditions to study the actions of gastrointestinal hormones. A negative pressure of 20 cm Hg was applied to the proximal end of the probe to attach the electrode to the bowel wall. An open tip catheter system was used to detect changes in intraluminal pressure, the opening of the fine polythene tube being brought out opposite the electrode. Pentagastrin in doses of 1.0 and 6 μg/kg/hr was given by continuous i.v. infusion 8 patients. Secretin was given by continuous i.v. infusion in separate tests in 0.25 and 1 U/kg/hr doses to 6 patients. In the fasting state during saline infusion in 16 patients, the frequency of the pacesetter potential varied between 11.2 and 12.6 cycles/min. Motor waves were recorded in all subjects. The percentage activity in the fasted state ranged from 1-45%. Secretin in a dose of 1 U/kg/hr and pentagstrin in a dose of 6 μg/kg/hr produced a significant effect on the frequency of action potential bursts. Secretin reduced, and pentagastrin increased, the bursts of action potentials. These changes in action potential frequency were in direct proportion to changes in motility during infusion with each hormone. The frequency of the pacesetter potential did not change significantly during infusion with either hormone.

0078 ACTION OF XYLAMIDE ON GASTROINTESTINAL MOTOR ACTIVITY IN ANIMALS AND ANIMAL ORGANS. *(E.)* Benzi, G. M.; Arrigoni, E.; Panceri, P.; Panzarasa, R.; Berte, F. (Dept. Pharmacol., Univ. Pavia, Italy). *Digestion* 9(2):149-165, 1973.

The action of xylamide on the gastrointestinal tract, activated by electrical or chemical stimulation, was studied *in vitro* in the guinea pig, cat, and mongrel dog; and *in situ* in mongrel and beagle dogs. In the guinea pig isolated stomach, transmural electrical stimulation produced a rapid contraction followed by an after-relaxation when stimulation ceased; the magnitude of the after-relaxation depended on the number of shocks delivered and on the frequency of stimulation, the higher the rate, the greater the magnitude. Xylamide (1.25-40 x 10^{-5}g/ml) into the organ bath reduced the contractor response to transmural and vagal stimulation. In the guinea pig isolated ileum, the transmural stimulation induced a rapid contraction followed by a rapid relaxation when stimulation was stopped. Xylamide (5-80 x 10^{-5}g/ml) induced a relaxation of the contraction. Xylamide inhibited the effects of acetylcholine, histamine, nicotine, and 5-hydroxytryptamine on the longitudinal muscle. In the guinea pig isolated terminal colon, stimulation of pelvic nerves induced a rapid contraction followed by a rapid relaxation. Transmural stimulation induced a triphasic response: contraction, relaxation, and inhibition. Xylamide (2-16 x 10^{-4}g/ml) reduced the contractions. Xylamide did not affect the action of adrenergic blocking agents. Transmural electrical stimula- of the isolated guinea pig and cat gall bladder produced a rapid contraction sometimes followed by an after relaxation. Xylamide (0.5-16 x 10^{-4} g/ml) induced either a progressive or a rapid inhibition of the contractions. Transmural electrical stimulation of the dog isolated bile duct produced a rapid contraction of the longitudinal smooth muscles and a decrease of the intracholedochal flow, followed by a rapid return to control conditions. Xylamide (1-8 x 10^{-4}g/ml) decreased the magnitude of the response after 30-60 min of contact. Xylamide flowing through the terminal bile duct (5-40 x 10^{-5}g/ml) induced an increase of the biliary flow, accompanied by a slight decrease of the duodenal motility, without change of the duodenal tone in *in situ* experiments in dogs.

0079 THE INTERACTION OF GLUCAGON AND PENTAGASTRIN ON THE LOWER OESOPHAGEAL SPHINCTER IN MAN AND DOG. *(E.)* Jennewein, H. M.; Waldeck, F.; Siewert, R.; Weiser, F.; Thimm, R. (Dept. Pharmacol., C. H. Boehringer Sohn, Ingelheim, Germany). *Gut* 14(11):861-864, 1973.

The effect of glucagon on the pressure inside the lower esophageal sphincter was studied in 24 conscious human volunteers (20-25 yr old), 10 patients suffering from achalasia (40-65 yr), and 12 anesthetized dogs. Single i.v. injections of glucagon cause a decrease in sphincteric pressure in both man and dog. Doses of 60 μg/kg in man and 100 μg/kg in dogs yield a maximum decrease in sphincteric tone. A continuous i.v. infusion of glucagon also causes a reduction in sphincteric tone. A glucagon infusion of 0.5 mg/kg hr reduces sphincteric pressure in dogs almost completely. Glucagon flattens the dose response curve of pentagastrin, the degree of flattening depends on the dose of glucagon administered. In humans, a glucagon infusion (750 μg/kg hr) resulted in a 40% decrease in sphincteric pressure. In 12 experiments on isolated muscle strips from the lower esophageal sphincter of dogs, the tension of the strips was regularly reduced by applying 10^{-8} and 10^{-5} g/ml glucagon. I.v. injection of 60 μg/kg glucagon in the 10 patients decreased the elevated resting pressure 3 min after administration. It is concluded that glucagon decreases the maximum pressure inside the lower esophageal sphincter in man and dog, when given as single injections or as continuous infusions.

0080 POSTOPERATIVE ILEUS IN THE RAT: PHYSIOPATHOLOGY, ETIOLOGY AND TREATMENT. *(E.)* Dubois, A.; Weise, V. K.; Kopin, I. J. (Natl. Inst. Mental Health, Bethesda, Md.). *Ann. Surg.* 178(6):781-786, 1973.

Ileus was induced in male Sprague-Dawley rats by laparotomy followed by intestinal exteriorization for 30 min. Sympathetic neuronal function and motor activity of the gastrointestinal tract during the postoperative phase were assessed directly by measurement of norepinephrine-^{14}C synthesis from Tyrosine-^{14}C and propulsion of a ^{51}Cr test meal. Both gastric emptying and small intestinal propulsive activity were impaired during the postoperative phase. Increased norepinephrine synthesis was observed in the digestive tracts of operated animals but not in their hearts. Chemical sympathectomy with 6-hydroxydopamine (150 mg/kg i.v.) prevented the appearance of postoperative ileus. The findings are consistent with the hypothesis that postoperative ileus is related to intestinal sympathetic hyperactivity occurring during the postoperative period.

0081 MECHANICS OF SPHINCTER ACTION: STUDIES ON THE LOWER ESOPHAGEAL SPHINCTER. *(E.)* Biancani, P.; Goyal, R. K.; Phillips, A.; Spiro, H. (Dept. Int. Med., Yale Univ., New Haven, Conn.). *J. Clin. Invest.* 52(12):2973-2978, 1973.

The mechanical factors involved in the genesis of lower esophageal sphincter pressure were studied in 99 Sprague-Dawley rats. Various degrees of circumferential stretch were applied by introducing probes of different diameters in the rat lower esophageal sphincter *in vivo*. The intraluminal pressure produced by the lower esophageal sphincter around each probe was measured and pressure-diameter curves were constructed during resting state, contraction produced by electrical stimulation, and relaxation produced by esophageal distension. The intraluminal pressure at an inside diameter of 0.5 mm was similar to that at inside diameter of 3.2 mm. This was true for the sphincter at rest as well as upon electrical stimulation. The pressure diameter curve, however, was sigmoid in shape with a decline and then an increase followed by decline in pressure again with increasing diameters. The ratio of wall thickness to inside radius or the magnification factor varied with inside diameters and this ratio increased steeply at small inside diameters. The tension diameter curves of the sphincter muscle showed that optimal tension development occurred not near sphincter closure but at a much wider diameter of 3.2 mm and that this muscle developed tension even at small luminal diameters. This behavior of the sphincter muscle ensures effective intraluminal pressure over a wide range of luminal diameters.

0082 ULTRASTRUCTURE OF THE LONGITUDINAL ILEUM MUSCLE AND ITS MICROSOMES IN THE GUINEA-PIG. *(Fr.)* Godfraind, T.; Sturbois, X.; Verbeke, N. (Lab. Pharmacodyn. Gen., Univ. Louvain, Belgium). *Arch. Intl. Physiol. Biochim.* 81(4):786-791, 1973.

0083 MECHANICAL RESPONSES OF THE SPHINCTER OF ODDI AND DUODENUM PREPARATIONS TO CERTAIN AUTONOMIC DRUGS AND TRANSMURAL STIMULATION. *(Jap.)* Azuma, H. (Fac. Med., Kyoto Univ., Japan). *Folia Pharmacol. Jap.* 69(5):711-720, 1973.

0084 CONDITIONS OF APPEARANCE OF A NEGATIVE PRESSURE IN THE STOMACH AND THE DUODENUM (RADIOTELEMETRIC DATA). *(Rus.)* Dedlovskaya, V. I. (Sverdlovsk Med. Inst., USSR). *Biull. Eksp. Biol. Med.* 76(11):44-47, 1973.

0085 ACTION OF METOCLOPRAMIDE AND PROCAINE ON ISOLATED STRIPS FROM THE STOMACH OF THE RAT. *(Fr.)* Fontaine, J.; Reuse, J. J. (Fac. Med., Free Univ. Brussels, Belgium). *Arch. Int. Pharmacodyn.* 204(1):191-195, 1973.

0086 THE IONIC CONTENT OF THE LONGITUDINAL MUSCLE OF THE GUINEA-PIG ILEUM. *(Fr.)* Burton, J.; Godfraind, T. (Lab. Pharmacodyn., Univ. Louvain, Belgium). *Arch. Intl. Pharmacodyn.* 204(1):181-183, 1973.

0087 ON THE POSSIBLE ROLE OF BRADYKININ IN FUNCTIONAL HYPEREMIA OF CAT'S STOMACH. *(E.)* Fasth, S.; Martinson, J. (Dept. Surg., Univ. Goteborg, Sweden). *Acta Physiol. Scand.* 89(3): 334-341, 1973.

0088 OBSERVER VARIATION IN ESOPHAGEAL PRESSURE ASSESSMENT. *(E.)* Fox, J. E.; Vidins, E. I.; Beck, I. T. (Dept. Med. Physiol., Queen's Univ., Canada). *Gastroenterology* 65(6):884-888, 1973.

MOTILITY

0089 SOME EFFECTS OF QUINIDINE AND QUININE ON THE ELECTROMYOGRAM OF THE COLON. *(E.)* Barker, J. D.; Christensen, J. (Univ. Hosp., Iowa City). *Gastroenterology* 65(5):773-777, 1973.

0090 THE EFFECT OF WEANING ON THE MOTILITY OF THE SMALL INTESTINE IN THE CALF. *(E.)* Ruckebusch, Y.; Bueno, L. (Natl. Vet. Sch., Toulouse Cedex, France). *Br. J. Nutr.* 30(3):491-499, 1973.

0091 THE EXTENT OF ELASTICITY OF THE SENILE SMALL INTESTINE. *(Ger.)* Nikolov, P.; Barlijev, B. (Central Lab. Biophys., Sofia, Bulgaria). *Radiol. Diagn. [Berl.]* 14(2):177-179, 1973.

0092 ACTION MECHANISMS OF THE CONTRACTING DRUGS, K, ACETYLCHOLINE AND Ba, AND OF THE RELAXANTS, ISOPROTERENOL AND PAPAVERINE IN THE RAT'S ISOLATED ILEUM, EXPECIALLY IN RELATION TO Ca. *(E.)* Taniuama, K. (Kobe Univ. Sch. Med., Japan). *Kobe J. Med. Sci.* 19:67-89, 1973.

0093 A STUDY OF COMPOUNDS WHICH INITIATE AND BLOCK NERVE IMPULSES IN THE PERFUSED RABBIT LIVER. *(E.)* Andrews, W. H. H.; Orbach, J. (Roy. Free Hosp. Sch. Med., London, England). *Br. J. Pharmacol.* 49(2):192-204, 1973.

0094 [^{3}H]-ADENINE NUCLEOTIDE AND [^{3}H]-NORADRENALINE RELEASE EVOKED BY ELECTRICAL FIELD STIMULATION, PERIVASCULAR NERVE STIMULATION AND NICOTINE FROM THE TAENIA OF THE GUINEA-PIG CAECUM. *(E.)* Kuchii, M.; Miyahara, J. T.; Shibata, S. (Sch. Med., Univ. Hawaii, Honolulu). *Br. J. Pharmacol.* 49(2):258-267, 1973.

0095 MOTILITY CHANGES ASSOCIATED WITH CANINE INTESTINAL ALLOGRAFTING. *(E.)* Schiller, W. R.; Suriyapa, C.; Mutchler, J. H. W.; Gohara, S. F.; Anderson, M. C. (Med. Coll. Ohio, Toledo). *J. Surg. Res.* 15(5):379-384, 1973.

0096 ELECTROCHEMICAL PROPERTIES OF THE MEMBRANES OF SMOOTH MUSCLE CELLS FROM THE CIRCULAR MUSCLES IN THE FROG STOMACH. *(Rus.)* Kazarian, K. V.; Martirosov, S. M. (Inst. Physiol., Erevan, USSR). *Biofizika* 18(5):839-844, 1973.

0097 THE EFFECT OF METOCLOPRAMIDE ON GASTRO-OESOPHAGEAL REFLUX. *(E.)* Bennett, J. R.; Stanciu, C. (Hull Roy. Infirm., England). *Postgrad. Med. J.* 49(4):65-68, 1973.

0098 THE STOMACH EVACUATORY FUNCTION AFTER ITS TRANSECTION AND ANASTOMOSING. *(Rus.)* Groisman, S. D.; Kharichenko, N. M. (Inst. Physiol., State Univ., Kiev, USSR). *Fiziol. Zh. SSSR.* 59(8):1257-1261, 1973.

See also 0010, 0106, 0351, 0642.

SECRETION AND METABOLISM

0099 SALIVARY AND PANCREATIC AMYLASE: ELECTROPHORETIC CHARACTERIZATIONS AND GENETIC STUDIES. *(E.)* Merritt, A. D.; Rivas, M. L.; Bixler, D.; Newell, R. (Indiana Univ. Med. Ctr., Indianapolis). *Am. J. Hum. Genet.* 25(5):510-522, 1973.

Discontinuous sheet polyacrylamide gel and agar gel electrophoresis were utilized to demonstrate the origin of amylase phenotypes and to identify 7 salivary (Amy$_1$) and 3 pancreatic (Amy$_2$) amylase phenotypes that are expressions of 2 closely linked loci on chromosome 1. The combined frequencies of the Amy$_1$ variants in Caucasian Americans and Afro-Americans is .0073 and .0769, resp. The frequency of Amy$_2$ B in Caucasian Americans and Afro-Americans is .105 and .029, resp. The Amy$_2$ C phenotype is present only in Americans of African descent at a frequency of .047 and is found also in black Africans. Of 4 new variants, Amy$_1$ F was found exclusively in 1 Chinese. The other 3 new variants determined in this study, Amy$_1$ E, Amy$_1$ G, and Amy$_2$ C were present only in these of black African descent. Family data demonstrate an autosomal dominant mode of inheritance for each of the variants. The use of agar gel electrophoresis as a single system to type Amy$_1$ and Amy$_2$ phenotypes is to be avoided.

0100 DETERMINATION OF IMMUNOGLOBULINS IN HUMAN GASTROINTESTINAL SECRETIONS AND A STUDY OF SOME FUNCTIONS OF ANTIBODIES. *(Fr.)* de Kalbermatten, A.; Girard, J. P. (Cantonal Hosp., Geneva, Switzerland). *Arch. Fr. Mal. App. Dig.* 62(1):33-52, 1973.

Quantitative determinations of IgA, IgG, and IgM were made on duodenal juice after stimulation with secretin (1 U/kg i.v.) or olive oil (40 ml) on 69 normal subjects and patients with a variety of gastrointestinal diseases. The results varied widely, particularly for IgG and, to a lesser extent, for IgM. The IgG/IgA ratio was about 1 comapred to 1/6 in the serum, while the IgG/IgM ratio was 0.75 in contrast to 15/1 in the serum. Concentrations of IgA were significantly increased in cholecystitis as were IgM concentrations in hepatitis, and might be related to the pathogenesis of these diseases. In normal subjects the β_1-C component of complement was detected in 39 of 45 specimens tested (5-104 mg/100 ml; mean of 30 mg/100 ml), and lysozyme was present in 36 of 64 specimens (mean of 2.8 μg/liter). The secretory piece was detected in almost all specimens from normal subjects, suggesting that IgA is exocrine in nature. Opsonin activities, determined morphologically and by the nitroblue tetrazolium method with *Escherichia coli*, *Salmonella typhi*, and *Staphylococcus aureus*, were significantly increased in the presence of complement. Anti-*E. coli* antibodies were detected in only 2 of 40 normal specimens by double diffusion in agar, while titers of 1:2 to 1:2048 were obtained on 52 of 72 specimens by passive hemagglutination. The hypothesis that this phenomenon is due to acquired immunity was tested by immunizing 12 infants p.o. with a polyvalent vaccine of pathogenic *E. coli* strains. Significant increases occurred in the titers of anti-*E. coli* antibodies in the stools and duodenal juice, and these increases were accompanied by an increase in IgA in duodenal juice which was significantly greater than increases in IgG and IgM. These studies strongly suggest that immunoglobulins in gastrointestinal secretions play an important role in protecting against pathogenic bacteria present on the mucosal surface.

0101 INFLUENCE OF SECRETIN ON SALIVARY MUCOUS SECRETION IN MAN. *(E.)* Descos, F.; Andre, F.; Lambert, R.; Andre, C. (Hosp. E. Herriot, Lyon, France). *Digestion* 9(3):199-204, 1973.

The influence of secretin on salivary mucous secretion was studied in 18 male subjects without any rhinopharyngeal or gastrointestinal disease. Saliva was collected for 2 hours in eight 15-min samples following overnight fasting. In one group of patients, saliva was collected in basal conditions; in the second group, saliva was collected as patients were steadily chewing parafilm. No significant variation in volume or outputs of fucose, hexosamine, or bicarbonate was observed in either the resting (saline, 100 ml/hr, was infused i.v. throughout the experiment) or stimulated (1250 CU/kg hr of secretin was added to saline) condition.

0102 THE RELATIVE CONTRIBUTIONS OF DIFFERENT SALIVARY GLANDS TO THE BLOOD GROUP ACTIVITY OF WHOLE SALIVA IN HUMANS. *(E.)* Milne, R. W.; Dawes, C. (Fac. Dent., Univ. Manitoba, Winnipeg, Canada). *Vox Sang.* 25(4):298-307, 1973.

0103 INCREASES IN POTASSIUM CONCENTRATION OF DOG SUBMAXILLARY SALIVA DURING INTRAVENOUS INFUSIONS OF OUABAIN. *(E.)* Siegel, I. A. (Dept. Oral Biol., Univ. Washington, Seattle). *J. Pharmacol. Exp. Ther.* 187(3):518-523, 1973.

0104 THE INFLUENCE OF ANDROGENS ON ENZYMES (CHYMOTRYPSIN- AND TRYPSIN-LIKE PROTEASES, RENIN, KABLIKREIN AND AMYLASE) AND ON CELLULAR STRUCTURE OF THE MOUSE SUBMAXILLARY GLAND. *(E.)* Bhoola, K. D.; Dorey, G.; Jones, C. W. (Dept. Pharmacol., Univ. Bristol, England). *J. Physiol.* 235(2):503-522, 1973.

0105 ALTERATIONS OF THE AUTONOMIC NERVOUS SYSTEM OF PAROTID GLAND AFTER ADMINISTRATION OF ANTIHYPERTENSIVA (GUANACLINE). ULTRASTRUCTURE AND FLUORESCENCE CYTOCHEMICAL FINDINGS ON THE PAROTID GLAND OF THE RAT. *(Ger.)* Donath, K.; Seifert, G. (Inst. Pathol. Univ. Hamburg, Germany). *Virchows Arch.* [*Pathol. Anat.*] 361(2):109-120, 1973.

0106 PROSTAGLANDINS AND THE DIGESTIVE SYSTEM. *(Fr.)* Matuchansky, C.; Bernier, J. J. (Hosp. Saint-Lazare, Paris, France). *Biol. Gastroenterol.* (*Paris*) 6(Supp. 3):251-268, 1973.

SECRETION AND METABOLISM

Stomach

0107 IMMUNOCHEMICAL STUDY OF FETAL PEPSINOGEN. *(Fr.)* Hirsch-Marie, H.; Touboul, J. P. (St. Antoine Hosp., Paris, France). *Biol. Gastroenterol. (Paris)* 6(1):55-62, 1973.

Pepsinogen was analyzed in ether-acetone extracts prepared from the stomachs of 34 embryos and fetuses obtained between the 2nd and 9th months of pregnancy. The results were compared with those obtained on extracts prepared from the gastric mucosa and gastric juice from adults and newborns. Only 1 zone of proteolytic activity with an optimum pH of 2.0 was present on agar gel electrophoresis of fetal extracts obtained during the first 8 months of pregnancy. During the 9th month, 2 additional bands appeared closer to the anode. By means of immunoelectrophoresis the protease found in fetuses during the first 8 months was identified as the enzyme obtained by activation of pepsinogen P IV, already described as a constituent of normal adult gastric mucosa. This pepsinogen was present in far larger amounts in the fetal than in the adult stomach. Although the amount of this pepsinogen was lower in newborns than in fetuses, it did not completely disappear, suggesting that repression of the genes responsible for its synthesis is incomplete.

0108 DESULFATION OF SULFATED POLYANIONS BY RAT GASTRIC MUCOSA. *(E.)* Liau, Y. H.; Horowitz, M. I. (New York Med. Coll., Valhalla). *Proc. Soc. Exp. Biol. Med.* 144(1):13-16, 1973.

The desulfation of sulfate polyanions by rat gastric mucosa was studied in 5 adult male Sprague-Dawley rats injected i.p. with 150 μC $Na_2{}^{35}SO_4$.

Fractions soluble in 0.125 M, 0.7 M, and 1.4 M aqueous $MgCl_2$ were obtained from the cetylpyridinium chloride (CPC) precipitation-fractional salt extraction procedure applied to the papain digest of stomach and duodenum scrapings. The following partition of radioactivity was found for these fractions: 130,000, 1,000,000, and 105,000 cpm, resp. The preparation of rib chondroitin sulfate was obtained in a yield of 8 mg/g cartilage and exhibited a specific activity of 9.1×10^5 cpm/mg of preparation. The preparation contained 84% chondroitin 4-sulfate, 8% chondroitin 6-sulfate, and 8% other polyanion sulfates. Fractionation with $(NH_4)_2SO_4$ afforded enrichment of the sulfatase and depolymerase enzymes in the precipitate obtained at 60-72% saturation. Enzyme activities were stable for at least 2 months when stored in pH 4.0 acetate buffer under toluene at 5 degrees.

0109 INHIBITION OF HUMAN GASTRIC SECRETION BY PROSTAGLANDIN. *(E.)* Carter, D. C.; Karim, S. M. M.; Bhana, D.; Ganesan, P. A. (Univ. Edinburgh, Scotland). *Br. J. Surg.* 60(10):828-831, 1973.

The inhibition of human gastric secretion by synthetic prostaglandin was studied in healthy male volunteers without previous dyspeptic history. In 11 tests 200 μg of the synthetic analogue prostaglandin 15(R)15 methyl-E_2 methyl ester were given p.o. to assess its effect on basal acid secretion; in 9 tests the same dose was administered by bolus i.v. injection. In 12 subjects, 200 μg of the analogue were given p.o. to challenge the acid secretion induced by pentagastrin (6 μg/kg i.m.). A marked and sustained reduction in acid secretion was noted in all the cases after the oral administration of 200 μg of the analogue. In 8 cases the aspirate became alkaline after instillation of the dose. The mean 3-hr acid output in control studies was reduced by 76% by prostaglandin administration. In only one subject was a marked and sustained rise in the pH of the aspirate observed following i.v. prostaglandin injection. The mean 3-hr output in control studies was reduced only by 24.5% following i.v. prostaglandin injection. In 11 of the 12 subjects, the maximal acid output was lowered by prior instillation of the prostaglandin analogue. It is concluded that prostaglandin is a potent inhibitor of basal and pentagastrin-induced acid secretion when given p.o. If the absence of side effects is confirmed, prostaglandin 15(R)15 methyl-E_2 methyl ester may be a valuable aid in management of peptic ulcer diathesis.

0110 METABOLIC CLEARANCE AND DISAPPEARANCE RATES OF SYNTHETIC HUMAN GASTRIN IN MAN. *(E.)* Schrumpf, E.; Semb, L. S.; Vold, H. (Ulleval Univ. Hosp. Oslo, Norway). *Scand. J. Gastroenterol.* 8(8):731-734, 1973.

Synthetic human gastrin (SHG) was infused i.v. at a constant rate for 2 hours in 5 volunteers. Gastrin concentration was determined by radioimmunoassay in plasma samples before, during, and at frequent intervals after the infusion. Gastric acid output was also measured. During the infusion the gastrin concentration and the gastric acid output reached a plateau level after approximately 30 min. After stopping the infusion there was a rapid decline in the plasma concentration of gastrin. Regression analysis indicated that the disappearance curve was at least bi-exponential, which means that the removal of gastrin is not proportional to the concentration. The mean metabolis clearance rate/kg was 9.1 ml/min. The metabolic clearance rate of SHG in this study is considerably smaller than previously found in the dog (70 ml/min/kg), suggesting that heterologous gastrin is broken down more rapidly than homologous gastrin.

0111 INHIBITION OF MEAL-INDUCED GASTRIC ACID SECRETION BY GLUCAGON. *(E.)* Lin, T. M. (Lilly Res. Labs., Indianapolis, Ind.). *Arch. Int. Pharmacodyn. Ther.* 204(2):361-367, 1973.

The secretion of hydrochloric acid from vagally innervated and denervated gastric pouches in dogs in response to a 200 g test meal was inhibited by a single injection of glucagon (10 μg/kg for 60 to 90 min. The acid response to a 400 g test meal was inhibited for at least 4 1/2 hr during continuous i.v. infusion of glucagon (12.5 μg/kg/hr). The same response was either unaffected or very slightly inhibited by continuous infusion of a solution of hypertonic glucose. The inhibitory effect of glucagon was not related to its action on blood sugar or the tissue utilization of sugar. The results suggest a direct action of the hormone on the gastric mucosa. Previous results indicate that in addition to an action on gastric mucosal blood flow, glucagon has a direct metabolic action on the acid producing cells under the influence of pentagastrin.

0112 BICARBONATE SECRETION IN THE HUMAN STOMACH. *(E.)* Andre, C.; Bruhiere, J.; Vagne, M.; Lambert, R. (Hosp. Ed. Herriot, Lyon, France). *Acta Hepatogastroenterol.* 20(1):62-69, 1973.

Electrolyte output of bicarbonate, sodium, chloride, and potassium was studied in 20 healthy subjects (17 males and 3 females) after a gastric load by a buffered glycine test meal. The outputs were compared in basal conditions and after injection of betazole (1.5 mg/kg, s.c.). Under the influence of betazole, bicarbonate and chloride output reached 235-266% and 373-580% of basal values, resp. Thus, bicarbonate secretion in the human stomach is not steady and increases when the fundic mucosa is stimulated. Sodium secretion was observed only after betazole administration. Calculation of concentrations demonstrated high values for chloride and bicarbonate explained by the trapping effect of glycine buffer on hydrogen ions.

0113 A PHYSIOLOGICAL INHIBITOR OF GASTRIC SECRETION, THE ACTIVATION PEPTIDE OF TRYPSINOGEN. *(E.)* Abita, J. P.; Moulin, A.; Lazdunski, M.; Hage, G.; Palasciano, G.; Brasca, A.; Tiscornia, O. (Dept. Biochem., Univ. Nice, France). *FEBS Lett.* 34(2):251-255, 1973.

Bovine trypsinogen was converted to trypsin. Isolation of the activation peptide of trypsinogen (peptide I) was carried out by filtration through Sephadex G-25 and ion-exchange chromatography. Surgical preparation, chronic gastric and pancreatic Thomas cannulae, was completed on 7 dogs. A constant rate infusion (100 ml/hr, i.v.) of pentagastrin (2 μg/kg/hr), human gastrin I (2 μg/kg/hr), or hog gastrin (2 μg/kg/hr) was used to stimulate gastric secretion. Once a plateau acid response was achieved, peptide I or control peptides were given i.v. or intraduodenally in doses from 300-2500 μg. Peptide I (700 μg, intraduodenally) rapidly inhibited the acid response to pentagastrin (2 μg/kg/hr). This inhibition remained significant for 1 hr. A second infusion produced a further inhibition of gastric secretion. A temporary inhibition of the acid response to 2 μg/kg/hr of hog or human gastrin I was also observed with 500 μg peptide I infused intraduodenally. Introduction of peptide I i.v. also produced inhibition. The inhibition of gastric juice secretion by the activation peptide of trypsinogen emphasizes that both components of the pancreatic secretion, the alkaline and the proteic, are important in the regulation of pH at the duodenal level. The former neutralizes the hydrochloric acid entering the duodenum. The latter, via the activation peptide of trypsinogen, counteracts the gastrin stimulation of the stomach. It is suggested that this activation peptide is one of the links connecting duodenal activation of the zymogens and their secretion by the pancreas.

0114 THE EFFECT OF A NEW DEPOT SECRETIN ON THE GASTRIC AND PANCREATIC SECRETIONS IN HUMANS. *(E.)* Demling, L.; Classen, M.; Koch, H.; Domschke, W. (Dept. Med., Univ. Erlangen Nuremberg, Germany). *Acta Hepatogastroenterol.* 20(4):324-330, 1973.

Secretin stimulates the pancreas to secrete water and bicarbonate. At the same time it inhibits the secretion of acid but promotes the production of pepsin in the stomach. Secretin (10 u/kg, s.c.), coupled to polyphloretin phosphate and a peptide mixture, was administered to 3 male volunteers, aged 22-61 yr, and led to production of 1.5-2.5 liters of pancreatic secretion within 10 hr containing 187-190 mEq of bicarbonate. The duration of the effect was 9-10 hr. The content of acid and pepsin in the stomach dropped considerably over the same period. The gastric production of acid and pepsin could not be determined accurately because of a duodenogastric reflux after the administration of secretin. These investigations form part of a clinical study of the use of secretin in the treatment of duodenal ulcer.

0115 INCREASED PRODUCTION OF CYCLIC AMP IN GASTRIC TISSUE BY STIMULATION OF HISTAMINE$_2$ (H_2)-RECEPTORS. *(E.)* Karppanen, H. O.; Westermann, E. (Med. Clin. Hannover, Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 279(1):83-87, 1973.

Histamine stimulated the production of cAMP by minced gastric tissue of guinea pigs in a dose-dependent manner in the presence of theophylline (10^{-3} M). This stimulation was competitively inhibited by the histamine$_2$-receptor blocking agent burimamide (3.3 X 10^{-4}M) but the histamine$_1$-receptor blocking agent diphenphydramine (3.3 X 10^{-4}M) only shifted the dose-response curve slightly to the right. Since the histamine-stimulated secretion of acid by the stomach is also inhibited by blockade of H_2-receptors but not by blockade of H_1-receptors, these findings support the role of cAMP as the mediator in the action of histamine on the secretion of gastric acid. The antihypertensive drug clonidine (2X10^{-6}moles/kg) increased the secretion of gastric acid in the stomachs of male Wistar rats in apparently the same way as histamine did, i.e. stimulation of H_2-receptors and subsequent increase in the formation of cAMP. During an *in vitro* study on cAMP production by gastric tissue of guinea pigs, clonidine (10^{-3}M) did not significantly increase production. When theophylline (10^{-3}M) was present, the stimulatory action of clonidine was greatly enhanced.

0116 CORRELATION BETWEEN THE OUTPUTS OF PEPSIN AND HCl BY ISOLATED, EX VIVO PERFUSED, CANINE STOMACH STIMULATED WITH HUMORAL AND CHOLINERGIC DRUGS. *(E.)* Kowalewski, K.; Kolodej, A. (Surg. Med. Res. Inst., Univ. Alberta, Edmonton, Canada). *Pharmacology* 9(6):325-335, 1973.

Gastric pepsin and hydrochloric acid were studied in the totally isolated canine stomach, perfused with homologous blood. Secretion was stimulated for several hours by intra-arterial infusion of histamine, pentagastrin, and bethanechol chloride, separately or combined. The ratio of outputs of pepsin and hydrochloric acid (P-O/HCl-O) were calculated. The relation between paired values of pepsin (mg/30 min) and H^+ (mEq/30 min) was analyzed by computer and the linear correlation was calculated. Bethanechol chloride emerged a very strong stimulant of pepsin and high (P-O/HCl-O) ratios were found in the presence of cholinergic stimulation applied separately or combined with the humoral secretagogues used. Bethanechol chloride potentiated the effect of histamine and pentagastrin on pepsin secretion. No potentiation was observed when histamine was combined with pentagastrin. The relation between pepsin and acid expressed by (P-O/HCl-O) ratio depended on the secretagogue used. Linear regression lines satisfactorily characterized the relation between pepsin and H^+ outputs under all conditions of stimulation applied.

0117 EFFECTS OF SALICYLATE AND RELATED COMPOUNDS ON GASTRIC HCl SECRETION. *(E.)*

Kasbekar, D. K. (Georgetown Univ. Sch. Med., Washington, D.C.). *Am. J. Physiol.* 225(3):521-527, 1973.

Isolated bullfrog gastric mucosas were examined under a variety of conditions to study the effects of submucosal and mucosal instillation of salicylate and related compounds on H^+ secretory and electrical properties. Submucosal addition of salicylate caused a concentration-dependent decline of H^+ secretion and potential difference with a concomitant rise in mucosal resistance. These effects were almost completely reversible following drug washout, except at very low mucosal pH values. The inhibition of H^+ secretion and loss of potential difference following mucosal instillation of salicylate was accompanied by a fall in transmucosal resistance. Reversibility of these parameters following washout is a function of the pH of luminal bathing medium, concentration of the drug, and time of exposure. Mucosal ATP levels were reversibly reduced by submucosal salicylate and irreversibly by mucosal instillation of salicylic acid at low pH. Preliminary studies with isolated mitochondrial preparations indicated that salicylate inhibits rather than uncouples oxidative phosphorylation.

0118 GASTRIC EFFECTS OF CYCLOHEXIMIDE. *(E.)*

Henman, F. D. (Dept. Pharmacol., Univ. Dundee, Scotland). *Digestion* 8(4):299-307, 1973.

Cycloheximide (50 mg/kg, i.p.) reduced the volume and acid concentration of gastric secretion elicited from gastric dual-ligated female Sprague-Dawley rats by administration of insulin (1 IU, s.c.) or histamine (5 mg, s.c.). Cycloheximide reduced the volume of gastric secretion of gastric dual-ligated rats stimulated by pentagastrin (200 µg) in a depot preparation. Pepsin concentration was unaltered. Cycloheximide did not increase the gastric back diffusion of acid from the stomach. The pentagastrin-stimulated increase in gastric specific histidine decarboxylase activity was prevented by cycloheximide. It is concluded that gastric secretion of acid involves the synthesis of a protein other than histidine decarboxylase.

0119 CHANGES IN GASTRIC SECRETION IN RATS DURING RESTRAINT AND THE EFFECT OF PREMEDICATION WITH ANTICHOLINERGIC AND HYPOTHALAMIC DEPRESSIVE AGENTS. *(E.)*

Birnbaum, D.; Karmeli, F.; Wauku, S. Y. (Hadassah Univ. Hosp., Jerusalem, Israel). *Rend. Gastroenterol.* 5(1):1-5, 1973.

The effect of anticholinergic and hypothalamic depressive drugs on gastric secretion was tested in restrained rats with chronic gastric fistula and was compared to control collections obtained from the same rats under identical experimental conditions. Premedication with paragon (0.2 mg/100 g, s.c.), mesoridazine (1.0 mg/100 g, s.c.), or diazepam (1.0 mg/100 g, s.c.) reduced gastric secretion from the control value of 2.49 ml/3 hr into 0.71, 0.96, and 1.21 ml/3 hr, resp. Total acid output was similarly diminished from a control value of 0.203 mEq/3hr to 0.059, 0.093, and 0.088 mEq/3 hr, resp. In pyloric-ligated rats comparison between restrained and unrestrained animals did not show a significant difference in volume, acid output, and incidence of erosions. Comparison between pyloric-ligated rats and those with gastric fistula, both under restraint stress, revealed the latter group secreted significantly lower amounts of gastric juice and acid.

0120 EFFECT OF L-THYROXINE ON SECRETORY RESPONSE TO HISTAMINE IN EX VIVO CANINE STOMACH PERFUSED WITH HOMOLOGOUS BLOOD OF THYROIDECTOMIZED DOG. *(E.)*

Kowalewski, K.; Kolodej, A. (Dept. Surg., Univ. Alberta, Edmonton, Canada). *Am. J. Dig. Dis.* 18(10):873-880, 1973.

Gastrectomized and gastrectomized plus thyroidectomized supporting dogs were used to study the effect of L-thyroxine on the secretory response to histamine in an *ex vivo* canine stomach. When *ex vivo* stomachs were perfused with the blood of thyroidectomized animals and stimulated with histamine, the output of gastric juice and of H^+, and the concentration of H^+, were significantly lower than in control stomachs perfused with the blood of normothyroid animals. When L-thyroxine was infused into the gastric artery of *ex vivo* stomachs, stimulated with histamine and perfused with the blood of thyroidectomized dogs, normal output and concentration of H^+ in these stomachs was observed. The exact mechanism of action of the thyroid hormone or its metabolites on gastric secretion is not known. The parietal cell may have been affected directly by a stimulant, which was the metabolic result of the injected thyroid hormone. It is also possible that the thyroid hormone modified the responsiveness of the parietal cell to histamine. A third possibility is that the thyroid hormone normalized gastric secretion by preventing gastric edema and reduction of motility.

0121 INFLUENCE OF VAGOTOMY ON TISSUE GASTRIN LEVELS IN STOMACH AND PANCREAS IN RATS. *(E.)*

Becker, H. D.; Reeder, D. D.; Thompson, J. C. (Univ. Texas Med. Branch, Galveston). *Surgery* 74(5):778-782, 1974.

The influence of vagotomy on tissue gastrin levels in stomach and pancreas was studied in 32 male Wistar rats. In a control group either a simple laparotomy (8 rats) or a Heinecke-Mikulica pyloroplasty (8 rats) was done. In the test group (16 rats) a truncal vagotomy with pyloroplasty was done. Gastrin concentrations and total gastrin contents in the two control groups did not differ. At 8 weeks after truncal vagotomy, the mean gastrin concentration in the antrum increased from 6410 to 13,930 ng/g tissue. The mean total gastrin in the antrum increased from 1772 to 4489 ng at 8 weeks. This increase in total gastrin was the result not only of an increase in gastrin concentration, but also of a 20% increase in the mean weight of the antrum. Truncal vagotomy increased mean fundic gastrin concentration from 31 to 367 ng/g at 8 weeks, and the total content from 19 to 263 ng. The mean weight of the fundus was 6.5% higher 8 weeks after vagotomy than in the control group. After truncal vagotomy, the mean gastrin concentration in the pancreas increased from 1.17 to 2.83 ng/g tissue and the total gastrin content from 0.26 to 0.72 ng. The mean weight of the pancreas was not changed by vagotomy. Loss of acid inhibition may be responsible for the increased gastrin concentrations, and the increase in stomach weight may be due to the trophic action of the larger amounts of gastrin.

0122 THE PEPSINOGENS OF HUMAN GASTRIC MUCOSA.

(E.) Whitecross, D. P.; Armstrong, C.; Clarke, A. D.; Piper, D. W. (Dept Med., Univ. Sydney, Australia). *Gut* 14(11):850-855, 1973.

Pepsinogens of human gastric mucosa were studied in samples of mucosa uninvolved in gastric lesion from 25 patients, taken from sites adjacent to areas of mucosa which were identified as fundic, antral, or duodenal mucosa using histological techniques. Gel electrophoretic patterns showed 6 major bands and 4 minor bands of protease activity. All were present in fundic mucosa, only the two slowly moving bands were prominent in antral mucosa and only one, the most slowly moving of the six present in fundic mucosa, was present in duodenal mucosa. The histological tissue type and the electrophoretic pattern agreed in 6 of 9 samples with a fundic electrophoretic pattern, 3 of 5 with an antral electrophoretic pattern, and in both samples with a duodenal electrophoretic pattern. The number of major bands observed did not vary with disease, age, sex, and smoking habits. On column chromatography of fundic mucosal homogenates, 6 well-defined peaks were obvious. Subsequent electrophoresis of the concentrated fractions from each peak showed that each was formed by an electrophoretically distinct pepsinogen with slight contamination by the adjacent pepsinogens due to overlapping of the peaks. Each of the pepsinogens 1 to 4 gave rise to a single pepsin band on electrophoresis; pepsinogen 5 gave rise to 2 pepsin bands of equal activity. Pepsinogen 6 was insufficiently concentrated for any activity to be detected. Both pepsins from pepsinogens 2 and 4 gave rise to activity curves of similar overall shape in the region pH 1.2-2.0. However, in the region pH 2.3-3.5 the activity curves showed different pH optima, and although both pepsins had similar activity in the pH 1.2-2.0 region, the pepsin from pepsinogen 2 was markedly more active in the pH 2.2-2.8 region.

0123 ASSESSMENT OF THE RELATIONSHIP BETWEEN GASTRIC SECRETORY CAPACITY AND JEJUNAL BACTERIOLOGY.

(E.) Frederiksen, W.; Bruusgaard, A.; Thaysen, E. H. (Aalborg Hosp. Nord, Denmark). *Scand. J. Gastroenterol.* 31(3):353-359, 1973.

The effect of gastric acid secretion on the bacterial population of the proximal small gut was studied in 282 patients without evidence of intestinal stasis. Significant bacterial counts ($>10^4$/ml) were obtained in fasting jejunal aspirates from 35 of 46 patients with gastric peak acid outputs between 0 and 5 mEq H^+/hr from 18 of 66 patients with peak acid outputs between 6 and 15 mEq H^+/hr: and from 16 of 170 patients with peak acid outputs equal to or greater than 16 mEq H^+/hr. Of 55 patients with intestinal stasis 48 had significant bacterial counts in their jejunal aspirates. In these patients the contamination of the proximal small gut was apparently independent of the gastric secretory capacity. The bacterial species recovered from jejunal aspirates in both groups were in part identical with those commonly isolated from saliva and also included a narrow selection of the bacterial population of the colon. Among the later *Escherichia coli* and other species of Enterobacteriacteae prevailed whereas the anaerobes were infrequent. The results of this study support the view that the gastric barrier to ingested bacteria is a pH-hydrochloric acid-dependent mechanism. It is suggested that there may be a relation between gastric anacidity or hyposecretion and the pathogenesis of enteric infections.

0124 EFFECT OF CALCIUM AND CALCITONIN ON GASTRIN AND GASTRIC SECRETION IN CATS. *(E.)*

Becker, H. D.; Konturek, S. J.; Reeder, D. D.; Thompson, J. C. (Univ. Texas Med. Br., Galveston). *Am. J. Physiol.* 225(2):277-280, 1973.

Intravenous infusion of calcium (10-40 mg/kg/hr) into cats with chronic gastric fistulas brought about dose-related increases in the levels of serum gastrin and gastric acid secretion. The maximal acid secretory response to hypercalcemia was about 25% of the maximal acid response to pentagastrin (16 µg/kg/hr). Calcitonin (20 U/kg/hr, i.v.) strongly inhibited histamine-, pentagastrin-, and calcium-induced gastric secretion and suppressed calcium-induced hypergastrinemia without changing serum calcium levels. Antrectomy prevented calcium-induced hypergastrinemia and stimulation of gastrin secretion. Atropine infusion (100 µg/kg/hr) significantly inhibited calcium-induced release of gastrin and stimulation of gastric secretion. In cats, as in man, calcium may be important in the regulation of gastric secretion. Calcitonin apparently suppresses calcium-induced gastric secretion both by suppression of gastrin release and by direct inhibition of the parietal cell.

0125 STUDIES OF GASTROINTESTINAL INTERACTIONS. V. GASTRIC SECRETION AND DUODENAL REFLUX IN MAN AFTER A COMPOSITE MEAL. THE INFLUENCE OF GLUCOSE ON GASTRIC SECRETION, EMPTYING AND GASTRIC VOLUME.

(E.) Lagerlof, H. O.; Johansson, C.; Ekelund, K. (Karolinska Inst., Stockholm, Sweden). *Scand. J. Gastroenterol.* 8(8):735-742, 1973.

The influence of glucose on gastric secretion, emptying, and gastric volume was studied in 7 healthy human subjects. A collecting plastic tube was introduced into the intestine 130 cm from the mouth. It was combined with 2 thinner tubes ending in the gastric antrum and duodenum. The fluid test meal (300 ml) contained polyethyleneglycol (PEG) as a marker. The nonglucose meal (NG-meal) contained 3.6% protein from skim milk powder, 6% fat from corn oil, and 5% lactose. On another occasion, the same subjects were given the same meal with 10% glucose added (G-meal). Regurgitated samples were obtained in 3 experiments with the NG-meal and in 5 with the G-meal. After the G-meals, the concentration of hydrochloric acid was 99.7 mEq/liter. The amounts of PEG decreased faster than the concentrations during the early periods after which the decrease was more parallel. After the G-meals, the gastric secretion could be followed for at least 180 min, after NG-meals for 140 min. Gastric volumes decreased more rapidly after the NG-meals than after the G-meals. No differences in the secretion rates were found between the 2 meals.

0126 KINETICS OF ATROPINE AND DIAMOX INHIBITION OF HISTAMINE-STIMULATED GASTRIC SECRETION. *(E.)* Hirschowitz, B. I.; Hutchinson, G. A.; Sachs, G. (Div. Gastroenterol., Univ. Alabama, Birmingham). *Scand. J. Gastroenterol.* 8(6):555-559, 1973.

The kinetics of atropine and acetazolamide inhibition of histamine-stimulated gastric secretion were studied in 7 mongrel dogs, each prepared with a Komarov esophagostomy and a Dragstedt gastric cannula. If, after a 16-hr fast with water allowed, there was no basal secretion, histamine was given i.v. as histamine acid phosphate in successive 45-min dose increments as follows: 2, 5, 10, 20, 50, 100, and 150 μg/kg/hr. The atropine was given into another vein at a constant rate of 10 μg/kg/hr in 11.5 ml saline/hr. The acetazolamide (50 mg/kg) was given in one slow injection 15 min before the start of the histamine infusion. Gastric juice was collected in consecutive 15-min periods. Blood samples were taken at the start and the end. The peak acid output occurs at 100 μg/kg/hr in the control study of histamine alone. With atropine, the S-shaped curve is shifted down and to the right, but maintains the same shape. With acetazolamide, the curve is substantially flattened, with far greater reduction at the higher doses and little dose-responsive increase in output. The output of pepsin was small with all 3 types of histamine experiment. In the control study, peak output occurred with 5 μg/kg/hr of histamine and then declined progressively as the dose was increased. Atropine suppressed the output more at lower doses of histamine; acetazolamide seemed to stimulate pepsin secretion somewhat.

0127 THE EFFECT OF ACTH AND CORTISONE ON GASTRIC ACID MUCOSUBSTANCES IN RATS. *(E.)* Kozlowska, K. (Inst. Med. Biol., Gdansk, Poland). *Digestion* 9(3):241-247, 1973.

The effects of ACTH and cortisone on gastric acid mucosubstances were studied in 3 groups of 160 male Wistar rats each. In one group, each animal was given 5 i.p. injections of 25 mg cortisone acetate suspension. The rats of the second group were treated with 25 mg of ACTH solution in distilled water. The control animals received only physiological saline. A significant increase in the acid mucosubstance content was observed in both the fundal and antral gastric mucosa after application of ACTH and cortisone. The mucosubstances isolated from the fundus of the control animals contained a higher amount of amino sugars and uronic acids than those from the antral mucosa. After treatment with steroid hormones, there was an increased content of amino sugars, more marked in the pyloric mucosa. The administered hormones significantly increased the content of sulfated polysaccharides in both parts of the gastric mucosa, but were more significant in the antral mucosa.

0128 SIGNIFICANCE OF THERMORECEPTORS IN GASTRIC ACTIVITY. *(Rus.)* Tsenina, V. S. (no affil.). *Vopr. Pitan.* (5):47-52, 1973.

0129 INHIBITION OF GASTRIC SECRETION BY INSULIN. *(E.)* Spencer, J.; Iweze, F. I. (VA Wadsworth Hosp. Ctr., Los Angeles, Calif.). *Scand. J. Gastroenterol.* 8(Suppl. 21):1-31, 1973.

0130 THE STOMACH EXCRETORY FUNCTION DURING PREGNANCY. *(Rus.)* Lipovsky, S. M. (Inst. Gynecol. Obstet., Leningrad, USSR). *Fiziol. Zh. SSSR* 59(1):173-175, 1973.

See also, 0062, 0136, 0328, 0367, 0374, 0389.

SECRETION AND METABOLISM

Pancreas

0131 INTERACTIONS BETWEEN INTRALUMINAL BILE ACIDS AND DIGESTIVE PRODUCTS ON PANCREATIC AND GALLBLADDER FUNCTION. *(E.)* Malagelada, J. R.; Go, V. L. W.; DiMagno, E. P.; Summerskill, W. H. J. (Mayo Clin., Rochester, Minn.). *J. Clin. Invest.* 52(9):2160-2165, 1973.

Interactions between bile acids (taurocholate (TC), taurochenodeoxycholate, (TCDC), or taurodeoxycholate, (TDC)) and digestive products (essential amino acids, (EAA) or monoolein, (MO)) in the lumen of the proximal small bowel, affecting pancreatic enzyme secretion and gallbladder contraction, were studied in 77 healthy male volunteers (aged 21-52 yr) by a perfusion method. Perfusion of EAA or MO caused significant increases in pancreatic enzyme output together with gallbladder contraction; MO was more potent and induced enzyme outputs comparable to the maximal response attained with intravenons cholecystokinin-pancreozymin (CCK-PZ, 0.250 U/kg/min for 60 min, i.v.). Perfusion of TC alone had no effect, but addition of 10 mM of TC, TCDC, or TDC to perfusates containing EAA, or 10 mM TC to MO, or both significantly reduced pancreatic enzyme output and prevented gallbladder contraction. Addition of 5 mM TC to EAA also produced a significant inhibitory effect. Inhibition of the stimulatory action of digestive products occurred in the jejunum as well as in the duodenum. The inhibitory action of bile acid was considered intraluminal since bile acid did not modify the effects of CCK-PZ given intravenously; and the stimulatory effect of digestive products perfused in the duodenum on pancreatic and gallbladder function was not influenced by simultaneous perfusion of bile acid in the jejunum. It is suggested that this inhibitory effect of bile acid is mediated through inhibition of CCK-PZ secretion by high intraluminal concentrations of bile acid. Inhibition of CCK-PZ secretion by bile acid may regulate pancreatic and gallbladder function during digestion by reducing pancreatic enzyme secretion and permitting the gallbladder to refill after evacuation of its contents.

0132 THE ACTION OF THE C-TERMINAL OCTAPEPTIDE OF CHOLECYSTOKININ AND RELATED PEPTIDES ON PANCREATIC EXOCRINE SECRETION. *(E.)* Nakajima, S. (Nagoya Univ. Sch. Med., Japan). *Gut* 14(8): 607-615, 1973.

Dogs were prepared with pancreatic fistulae to study the effect of the C-terminal octapeptide of cholecystokinin-pancreozymin, caerulein, and the C-terminal tetrapeptide of gastrin on pancreatic secretion of fluid, electrolyte, amylase, and protein. All the polypeptides produced a qualitatively similar pancreatic response, against background stimulation of fluid secretion with submaximal doses of secretin, causing highly significant increases in amylase, protein, calcium, and zinc concentrations. Magnesium concentration was significantly increased only when the concentration preceding the administration of the peptide was below 100 μEq/liter. Cholecystokinin-pancreozymin was 13-35 times and 20-56 times more potent than tetragastrin on weight and molar bases, resp., as a stimulant of amylase secretion. The threshold doses were largest for amylase, lower for calcium, and lowest for zinc. There was a significant linear correlation between amylase and calcium concentration, zinc and protein concentration, and magnesium and calcium concentration. Some increases were produced in secretin-induced volume flow, whereas bicarbonate, chloride, sodium, and potassium concentrations were unchanged. The direct relation between bicarbonate concentration and flow rate was limited to rates below 1.5 ml/5 min. At higher rates bicarbonate and chloride concentration reached a high and low plateau, resp., although the first 5-min sample of pancreatic juice after secretin stimulation exhibited a relatively low bicarbonate and high chloride concentration compared with its voluminous flow. Chloride and bicarbonate concentrations varied inversely; the sum of these 2 anions was constant.

0133 EFFECT OF GIH CHOLECYSTOKININ-PANCREOZYMIN ON VASOMOTOR ACTIVITY OF THE ISOLATED DOG PANCREAS. RELATIONS BETWEEN VASOMOTOR ACTIVITY AND SECRETORY RESPONSE. *(Fr.)* Vaysse, N.; Martinel, C.; Lacroix, A.; Pascal, J. P.; Ribet, A. (Purpan Hosp., Toulouse, France). *Biol. Gastroenterol. (Paris)* 6(1):33-40, 1973.

Perfusion of the isolated dog pancreas with 2.5-100 Ivy U/hr of GIH cholecystokinin-pancreozymin (CCK-PZ) produced vasodilation accompanied by a drop in vascular resistance. At doses between 2.5 and 25 Ivy U/hr a linear relation was found between the dose and the drop in vascular resistance. No increase in vasodilation occurred above 25 Ivy U/hr. When secretin (10 clinical U/hr) was added to the perfusion medium along with CCK-PZ (10 or 100 Ivy U/hr), secretin caused a significant drop in vascular resistance at the lower dose but had no appreciable effect at the higher dose. At doses of 2.5 and 10 Ivy U/hr, CCK-PZ had little or no effect on pancreatic secretion, while at doses of 25 and 100 Ivy U/hr its effect varied, probably because of contamination with secretin. The volume of pancreatic secretion obtained was always higher when arterial pressure remained constant, i.e., when arterial blood flow increased due to vasodilation, than when blood flow was maintained at its basal level. Significant increases in protein output, caused by CCK-PZ but not secretin, were not the result of an increase in the volume of pancreatic secretion. This observation suggests that vasodilation and increased blood flow potentiate the protein response to CCK-PZ stimulation.

0134 MEMBRANES AND SECRETION. *(E.)* Jamieson, J. D. (Yale Univ. Sch. Med., New Haven, Conn.). *Hosp. Pract.* 8(12):71-80, 1973.

0135 EXOCRINE PANCREATIC SECRETIONS IN NORMAL INFANTS AND CHILDREN. *(Fr.)* Bier, H.; Polonovski, C. (Hosp. Trousseau, Paris, France). *Pathol. Biol.* 21(9):1003-1013, 1973.

0136 AMYLOLYTIC ACTIVITY OF THE GASTRIC JUICE IN DOGS FOLLOWING EXCLUSION OF EXTERNAL SECRETION OF THE PANCREAS. *(Rus.)* Blagovidov, D. F.; Pomeltsov, A. N.; Shatalov, V. N. (USSR Ministry Hlth., Moscow). *Biull. Eksper. Biol. Med.* 76(11):41-43, 1973.

0137 TYPES OF SECRETION OF ACINI OF THE PANCREAS. *(Rus.)* Permyakov, N. N.; Podolsky, A. E.; Titova, G. P. (Sklifosovsky Res. Inst. First Aid, Moscow, USSR). *Biull. Eksp. Biol. Med.* 76(11):115-117, 1973.

0138 INHIBITION OF DUODENAL PANCREATIC ENZYMIC ACTIVITIES BY POLYPHLORETIN PHOSPHATE WITH SPECIAL REFERENCE TO PHOSPHOLIPASE A$_2$. *(E.)* Arnesjo, B.; Ihse, I.; Qvist, I. (Dept. Surg., Univ. Hosp., Lund, Sweden). *Acta Chem. Scand.* 27(6):2225-2227, 1973.

0139 EFFECTS ON EXOCRINE AND ENDOCRINE RAT PANCREATIC FUNCTIONS OF BOVINE LUNG TRYPSIN INHIBITOR ADMINISTERED PERORALLY. *(E.)* Arnesjo, B.; Ihse, I.; Lundquist, I.; Qvist, I. (Dept. Surg., Univ. Lund, Sweden). *Scand. J. Gastroenterol.* 8(6):545-554, 1973.

0140 THE ROLE OF CARBOXYL GROUPS IN THE ACTIVITY OF PANCREATIC LIPASE. *(E.)* Dufour, C.; Semeriva, M.; Desnuelle, P. (Inst. Chem. Biol., Univ. Provence, Marseille, France). *Biochim. Biophys. Acta* 327:101-113, 1973.

0141 EXOCRINE AND ENDOCRINE ACTIVITY OF THE PANCREAS ACCORDING TO THE FOOD IRRITANTS. *(Rus.)* Korotko, G. F.; Sarkisova, A. C. (Med. Inst., Andijan, USSR). *Fiziol. Zh. SSSR* 59(10):1574-1581, 1973.

See also, 0007, 0023, 0099, 0114, 0121, 0228, 0380.

SECRETION AND METABOLISM

Hepatobiliary Tract

0142 METABOLIC ACTIVATION OF HALOTHANE AND ITS COVALENT BINDING TO LIVER ENDOPLASMIC PROTEINS *IN VITRO*. *(E.)* Uehleke, H.; Hellmer, K. H.; Tabarelli-Poplawski, S. (Pharmacol. Inst., Univ. Tubingen, Germany). *Naunyn-Schmiedebergs Arch. Pharmacol.* 279(1):39-52, 1973.

Halothane produces a difference absorption spectrum with a maximum at 473 nm and a minimum at 408 nm in suspensions of rabbit liver microsomes reduced by dithionite or reduced nicotinamide adenine dinucleotide phosphate (NADPH). The optical affinity was in the region of 3-6x10^{-6} M for dithionite reduced microsomes. The maximal absorption with dithionite reduced microsomes for halothane (473-550 nm) was 0.017-0.019 and for carbon tetrachloride (CCL$_4$) (454-500 nm) 0.04-0.05 nmol of cytochrome P-450. The appearance of the difference absorption with halothane is faster than that with CCL$_4$. During anaerobic incubation with NADPH-reduced liver microsomes from phenobarbital pretreated rabbits, ^{14}C-labelled halothane (1mM) was covalently bound to microsomal proteins at a rate of 2 nmol/mg protein in 30 min (CCL$_4$:11 nmol/mg protein in 30 min). Reduction by dithionite was ineffective. The binding of halothane was 60% inhibited in a gas phase of air, 75% by carbon monoxide, 55% in the presence of 1 mM metyrapone, 50% by CCL$_4$, but only 20% by reduced glutathione. The binding of the radioactivity from labelled halothane and CCL$_4$ to proteins of isolated rabbit lung and kidney microsomes was proportional to cytochrome P-450 concentrations in the organ fractions. Like CCL$_4$, halothane (1 mM) inhibited several microsomal drug oxidation reactions. These results suggest that irreversible binding of halothane or its metabolite(s) to endoplasmic proteins might be connected with halothane liver damage.

0143 ADRENERGIC RECEPTORS IN RAT LIVER I. EFFECTS OF EPINEPHRINE AND ADRENERGIC BLOCKING AGENTS ON GLUCONEOGENESIS IN PERFUSED LIVER. *(E.)* Hagino, Y.; Nakashima, M. (Nagoya Univ. Sch. Med., Japan). *Jap. J. Pharmacol.* 23(4):543-551, 1973.

Gluconeogenesis from lactate in normal and hypothyroid liver from Wistar male rats was examined to clarify the adrenergic receptor mechanisms. When epinephrine (at a concentration of 1 x 10^{-6} M in the perfusate) was perfused into normal liver, the level of glucose in perfusate was elevated 2-fold. An elevation also occurred in hypothyroid livers in response to epinephrine. In the hypothyroid group, the rate of glucose production decreased to about 60% that of normal during perfusion of 20 mM lactate for 30 min. In the normal liver, addition of an α or β adrenergic blocking agent together with epinephrine did not show any significant change as compared to epinephrine alone, but, in hypothyroidism, a different metabolic response was observed with the administration of adrenergic antagonists, phentolamine or propanolol, together with epinephrine. Dibutyryl AMP (1 x 10^{-4} M) had the same effect as epinephrine on gluconeogenesis from lactate in both normal and hypothyroid livers. These data suggest that the β adrenergic receptor is important in the normal liver. The α adrenergic receptor may be important in stimulated gluconeogenesis from lactate in hypothyroidism. It is possible that AMP mediates the effect of epinephrine even in the hypothyroid state.

0144 EFFECTS OF BROMOBENZENE AND CARBON TETRACHLORIDE ON THE SYNTHESIS AND RELEASE OF PROTEINS BY PERFUSED RAT LIVER. *(E.)* Davis, D.

C.; Hashimoto, M.; Gillette, J. R. (Emory Univ. Sch. Med., Atlanta, Ga.). *Biochem. Pharmacol.* 22(16):1989-2001), 1973.

The effects of bromobenzene and carbon tetrachloride (CCL_4) on the hepatic incorporation of ^{14}C-L-leucine into protein were studied to determine the relation between liver necrosis and impairment of radiolabeled protein synthesis and release caused by these toxicants. Male rats were treated with bromobenzene or CCL_4 and 4 or 12 hr later the livers were removed and perfused *in vitro* in a recirculating perfusion apparatus.CCL_4 only slightly impaired the rate of synthesis of radiolabeled proteins (liver + serum) but markedly decreased the release of radiolabeled proteins into the serum (perfusate) at 4 hr after its administration. At 4 hr after the administration of bromobenzene, the rates of incorporation of ^{14}C-L-leucine into proteins and the release of radiolabeled proteins were not appreciably changed. At 12 hr after bromobenzene, the rate of radiolabeled protein synthesis was not altered when compared with control livers, but the release of ^{14}C-labeled proteins into the perfusate was decreased. After pretreatment of rats with phenobarbital, bromobenzene decreased the synthesis and the release of ^{14}C-labeled proteins (4 hr). β-Diethylaminoethyl diphenylpropylacetate and 3-methylcholanthrene did not alter the effect of bromobenzene on the accumulation of total radiolabeled protein synthesis, while β-diethylaminoethyl diphenylpropylacetate, but not 3-methylcholanthrene, blocked the ability of bromobenzene to decrease the release of ^{14}C-labeled proteins into serum. Since bromobenzene does not alter the rate of ^{14}C-labeled protein synthesis at 4 or 12 hr after administration, impairment of protein synthesis is probably not a primary cause of bromobenzene-induced liver necrosis. Evidence suggests that the decrease in the release of ^{14}C-labeled proteins in the perfusate is due to changes in the pattern of protein synthesis as well as to decreases in the rate of protein synthesis.

0145 MAINTENANCE IN VITRO OF FUNCTIONALLY ACTIVE ADULT HUMAN LIVER.

(E.) Sandstrom, B. Dept. Human Anat., Univ. Uppsala, Sweden). *Acta epatogastroenterol.* 20(1):19-23, 1973.

technique has been devised whereby normal adult uman liver may be maintained functionally repreentative in tissue culture. The culture medium onsists of 2 parts of balanced salt solution and 1 art of fetal calf serum. The salt solution is nriched with caseine hydrolysate, streptomycin sulate, and penicillin. The pH of the salt solution s adjusted to 7.4-7.8 with isotonic NaOH. Glucose oncentration of the medium is 270 mg%. This techique is suited for experimental studies on interediary metabolism, oxygen consumption, bile secreion, and enzyme activities. It is suggested that his will be a valuable system for studies on the ventual hepatotoxicity for man of drugs and food dditives as well as in attempts to propagate human epatitis virus.

0146 METABOLIC EFFECTS OF ETHANOL IN REGENERATING RAT LIVER.

(E.) Seshachalam, D. (Creighton Univ. Sch. Med., Omaha, Neb.). *Biochem. Med.* 7(2):235-240, 1973.

Wistar male albino rats were partially hepatectomized by removal of about 70% of the liver lobes. After sacrifice, liver slices were prepared. Ethanol (10 mM) inhibited labeled carbon dioxide formation with all substrates used in both regenerating and normal rat liver slices, but this inhibition was less pronounced with succinate and galactose in normal and regenerating liver, resp. Alcohol dehydrogenase activity in both types of tissue homogenates was approximately 8×10^{-4} U/mg protein. The yield of labeled carbon dioxide in both tissue types formed from labeled ($1-^{14}C$) glucose was larger than the amount of labeled carbon dioxide produced from ($6-^{14}C$) glucose. In normal liver, 5 mM ethanol inhibited 70% of the labeled carbon dioxide formation when ($6-^{14}C$) glucose was the substrate, but only 41% with ($1-^{14}C$) glucose. In regenerating liver, however, ethanol inhibited 24% of labeled carbon dioxide formation from ($1-^{14}C$) glucose. With acetate as substrate, carbon dioxide formation was slightly greater in normal tissue than in regenerating tissue. The slower oxidation of acetate may be due to a somewhat low rate of conversion of free acetate to acetyl coenzyme A in this tissue. Attenuation of the inhibitory action of ethanol on carbon dioxide formation from labeled galactose in regenerating liver is partly due to diversion of the galactose to the hexosemonophosphate shunt and partly to resistance of the tissue to the toxicity. In contrast to galactose oxidation, succinate oxidation appears more sensitive to ethanol toxicity in the regenerating tissue.

0147 TOXICITY OF TETRACYCLINES IN RAT-SMALL-INTESTINAL EPITHELIUM AND LIVER.

(E.) De Jonge, H. R. (Rotterdam Med. Sch., Netherlands). *Biochem. Pharmacol.* 22(21):2659-2677, 1973.

Male Wistar rats suffered from severe damage of structure and function of the small intestinal epithelium and showed excessive accumulation of fat in the liver after 3 or more days of treatment with oxytetracycline (300 mg/kg, i.m.). Several possible modes of action of this drug were studied to explain this toxicity. No direct correlation was found between the strong inhibitory effect on mitochondrial protein synthesis, leading to drastically lowered mitochondrial cytochrome levels in the rapidly dividing small intestinal epithelial cells, and a disturbance of mitochondrial energy production. No epithelial cell damage was observed after chloramphenicol treatment, producing a similar decrease of cytochrome contents. At the stage of oxytetracycline treatment in which minimal cytochrome levels were reached but still no structural damage of the epithelium was observed, the energy-stores in the epithelial cells and the rate of oxidative phosphorylation in isolated intestinal mitochondria was unaffected. When morphological alterations of the villus were clearly observed histologically, after 3-4 days, the rate of proliferation of the crypt cell population was not significantly affected, suggesting again a lack of influence on energy metabolism in the crypt cells. During short incubations of isolated villous cells, the cellular energy charge and the rate of amino acid incorporation into protein strongly decreased after anaerobiosis and addition of potassium cyanide, oligomycin, or 2,4-dinitrophenol, conditions which impair the mitochondrial energetic function. However, incubation with 100-500 μg/ml of several tetracyclines, doxycycline having the strongest effect, significantly inhibited cytoplasmic protein synthesis without affecting the rate of glycolysis and respiration or the energy charge in the epithelial cells. These observations suggest that the toxic effects of oxytetracycline are based on its interaction with cytoplasmic protein synthesis under conditions of drug accumulation in blood and tissues. After extended treatment the lowering of energy charge in liver and intestine may be secondary effects of this action, namely of fatty infiltration in the liver and structural damage of the villous epithelium, resp.

0148 INCORPORATION OF ORALLY ADMINISTERED GLUCOSE-U-^{14}C AND FRUCTOSE-U-^{14}C INTO THE TRIGLYCERIDE OF LIVER, PLASMA, AND ADIPOSE TISSUE OF RATS.

(E.) Maruhama, Y.; Macdonald, I. (Guy Hosp. Med. Sch., London, England). *Metabolism* 22(9):1205-1215, 1973.

Male Wistar rats, fasted for 5-6 hr, were given 5μCi of glucose-U-^{14}C or fructose-U-^{14}C, in 0.5 g of their respective carrier, by intragastric instillation. Sequential radioactivity in plasma carbohydrates and in the triglyceride of the liver, plasma, and adipose tissue and plasma immunoreactive insulin and free fatty acids were measured. By measuring the metabolic activity of endogenous glucose, the validity of taking the triglyceride labeling rate as the triglyceride synthesis rate was tested. Radioactivity was 2-3 times greater in the liver and plasma triglycerides after fructose than after glucose while the reverse was true for adipose tissue. The greater radioactivity in triglyceride of the liver and plasma after fructose was due to triglyceride-glycerol radioactivity. The radioactivity of both triglyceride-fatty acids and triglyceride-glycerol accounted for the greater radioactivity in adipose tissue triglyceride. Three hr after glucose, 92% of the total radioactivity in triglyceride was in adipose tissue and 8% was in the liver. However, 3 hr after fructose, 57% of the radioactivity was in adipose tissue and 42% was in the liver. It is suggested that daily repetition of such a pattern of fructose handling may lead to abnormal metabolism of endogenous triglyceride.

0149 HYCANTHONE-INDUCED HEPATIC CHANGES IN MICE INFECTED WITH SCHISTOSOMA MANSONI.

(E.) Haese, W. H.; Smith, D. L.; Bueding, E. (Sch. Med., Johns Hopkins Univ., Baltimore, Md.). *J. Pharmacol. Exp. Ther.* 186(3):430-440, 1973.

Female Swiss-Webster mice were infected with cercariae of *Schistosoma mansoni*. After 54-104 weeks, hepatic hyperplasia was observed in 29% of the animals. Cessation of egg production and elimination of the worms, brought about by the administration of the schistosomicidal drug nitrovinylfuran SQ 18,506 (ig/kg, p.o. b.i.d., for 5 days) 55 days after infection, lowered the incidence of hepatic hyperplasias. Administration of a single dose of hycanthone, another antischistosomal drug, significantly increased the incidence of hepatic hyperplasia. Furthermore, the appearance of hepatocellular carcinomas was observed in hycanthone-treated infected mice, even after the adult worms had been killed and the deposition of eggs eliminated. In uninfected mice a single dose of hycanthone produced neither hepatic hyperplasia nor hepatomas. It is concluded that the hepatic hyperplasia, induced by the deposition of schistosome eggs in the liver and enhanced by hycanthone, is a predisposing factor for a hepatocarcinogenic effect of this drug.

0150 LIVER ULTRASTRUCTURE AND RNA SYNTHESIS IN DIABETIC RATS FED ON HIGH AND NON-PROTEIN DIETS.

(E.) Stenram, U.; Wilander, E. (Dept. Pathol., Univ. Uppsala, Sweden). *Virchows Arch. (Zellpathol.)* 14(1):57-68, 1973.

Male Sprague-Dawley rats were made diabetic with streptozotocin or alloxan. After a week, the rats were fed a 25% casein or a protein-free diet. After 5 days they were given ^{3}H-cytidine (2.5 μCi, i.p.) and killed after 18 hr. Liver RNA synthesis was estimated by determining the ratio specific RNA activity/specific acid-soluble nucleotide activity, and the product of the above mentioned ratio and the RNA/DNA ratio. The protein-fed, diabetic rats showed a 175% increase in liver RNA synthesis and a decreased amount of rough-surfaced endoplasmic reticulum in the liver cell cytoplasm as compared with protein-fed, nondiabetic rats. The protein-deprived, diabetic rats showed a 40% increase in RNA synthesis as compared with protein-deprived, nondiabetic rats, but no differences were noted in liver ultrastructure. The protein-deprived, nondiabetic rats had a decreased amount of rough-surfaced endoplasmic reticulum and an 82% increased ratio, specific RNA activity/specific acid-soluble nucleotide activity, as compared with the protein-fed, nondiabetic rats. The RNA labeling profiles following gel electrophoresis were of the same shape in all groups.

0151 HEPATIC DRUG METABOLISM AND PROTEIN MALNUTRITION.

(E.) Rumack, B. H.; Holtzman, J.; Chase, H. P. (Univ. Colorado Med. Ctr., Denver). *J. Pharmacol. Exp. Ther.* 186(3):441-446, 1973.

The effect of chronic protein malnutrition on hepatic microsomal drug metabolism, specifically of the mixed function oxidases was investigated. *Macaca nemestrina* monkeys fed protein-deficient diets developed classic features of marasmic kwashiorkor with edema and weight less than 60% of controls. Total microsomal heme, phospholipids, and flavin adenine dinucleotide levels, all of which are involved in microsomal drug metabolism, were significantly reduced in malnourished animals. Malnourished monkeys had significantly lower quantities of microsomal protein as well as lower activity of cytochrome P-450 reductase. Cytochrome P-450 reductase is recognized to be the central component of the mixed function oxidases in drug hydroxylations. Because of these findings, ethylmorphine and aniline were studied *in vitro* to investigate possible alterations in their metabolism secondary to malnutrition. There were no differences in kinetic data comparing the control with the malnourished group when metabolism was expressed per mg microsomal protein or per kg body weight. Alterations observed in this study, as well as previous descriptions of altered hexobarbital sleeping time, suggest the drug dosage should be reduced in the presence of protein malnutrition.

0152 BILIARY EXCRETION OF CARDIAC GLYCOSIDES.

(E.) Russell, J. Q.; Klaassen, C. D. (Univ. Kansas Med. Ctr., Kansas City). *J. Pharmacol. Exp. Ther.* 186(3):455-462, 1973.

The rat was shown to be more resistant to the lethal properties of the glycosides, ouabain, digoxin, and digitoxin than either the rabbit or dog. The rat's relative resistance did depend on the glycoside used. The smallest difference in sensitivity occurred with digitoxin to which the rat was 9 times more resistant than the rabbit and 14 times more resistant than the dog. With digoxin, the rat was 25 times more resistant than the rabbit and 92 times more resistant than the dog. The greatest difference occurred with ouabain in which the rat was 63 times more resistant than the rabbit and 110 times more resistant than the dog. Digoxin was excreted into bile similarly by both rats and rabbits (approximately 60% in 12 hr), while dogs excreted only 1/5 that amount. With digitoxin, minor quantitative differences were observed in biliary excretion in the 3 species studied (45-70% in 12 hr). In all 3, digoxin and digitoxin were excreted against an apparent bile to plasma concentration gradient, ranging from 10 to 300. These results suggest that digoxin and digitoxin are excreted into the bile by a transport process, that no general correlation between the polarity of cardiac glycosides and their biliary excretion exists, and that the additional resistance of the rat to the lethal properties of ouabain and digoxin over that observed with digitoxin is partially due to a higher rate of excretion of these 2 glycosides into the bile.

0153 ROLE OF INFECTED BILE IN SPASM OF THE SPHINCTER OF ODDI.

(E.) Poncelet, P. R.; Thompson, A. G. (Dept. Surg., Laval Univ., Quebec, Canada). *Am. J. Surg.* 126(3):387-391, 1973.

Prolonged spasm of the sphincter of Oddi in the cat was produced by contact of infected bile with the terminal common bile duct. In 1 group of cats perfusion with conjugated bile salts and free cholate did not increase sphincteric resistance. Perfusion with free chenodeoxycholate slightly increased the common bile duct pressure. Use of free deoxycholate markedly increased sphincteric resistance, suggesting that bacterial deconjugation and dehydroxylation of bile salts are responsible for the spasm. In a second group of cats, perfusion with normal hepatic bile did not change common bile duct pressure, but perfusion with infected hepatic bile caused a definite rise in pressure of about 115%. Addition of 2% sodium cholate to normal hepatic bile increased the pressure by about 70%. Addition of sodium deoxycholate caused a 400% increase in pressure. It is suggested that the increased resistance was due to a nonspecific irritating effect of infected bile, in which free bile salts were found in large amounts. No pressure changes occurred when bacteria alone were perfused, suggesting that the bacterial factor in itself plays little if any part in sphincter spasm. A spasm of the sphincter of Oddi is a possible mechanism by which an obstructive type of jaundice or pancreatitis can develop in a gallstone patient.

0154 INDUCTION OF HEPATIC MICROSOMAL REDUCED NICOTINAMIDE ADENINE DINUCLEOTIDE PHOSPHATE-DEPENDENT PRODUCTION OF HYDROGEN PEROXIDE BY CHRONIC PRIOR TREATMENT WITH ETHANOL.

(E.) Thurman, R. G. (Johnson Res. Fdn., Univ. Pennsylvania, Philadelphia). *Mol. Pharmacol.* 9(5):670-675, 1973.

Male Holtzman rats were treated for 21-28 days with a semiliquid diet containing ethanol. This resulted in a near doubling of liver microsomal cytochrome P-450 content. At the same time, significant increases in the rate of reduced nicotinamide adenine dinucleotide diphosphate (NADPH) oxidation, "endogenous" respiration, and acetaldehyde formation from ethanol in microsomes were noted. An average increase in NADPH-dependent hydrogen peroxide formation of 45% resulted from chronic ethanol treatment, employing the decrease in scopoletin fluorescence or the formation of cytochrome peroxidase complex II as hydrogen peroxide-detecting systems. Since the rate-limiting step for ethanol oxidation in microsomes is the rate of generation of hydrogen peroxide for the peroxidatic reaction of catalase, this adaptive increase in hydrogen peroxide production due to chronic ethanol treatment most likely accounts for the enhanced ethanol oxidation via catalase-H_2O_2. The data support the hypothesis that microsomal ethanol oxidation is due to peroxidation via catalase utilizing microsomal hydrogen peroxide.

0155 CRYOTHERAPY OF IMPLANTED CANCER IN THE RAT LIVER.

(E.) Grady, E. D.; Nolan, T. R.; Crumbley, A. J.; Cheek, W. V.; Copelan, N.; Kunzler, H. C. (Nuclear Res. Ctr., Georgia Inst. Technol., Atlanta). *Oncology* 28(2):104-109, 1973.

Cryosurgery was performed on solid liver tumors in rats to investigate the effect of freezing liver cancers. Of 21 Sprague-Dawley rats with single liver implants of Walker-256 tumor, 8 were apparently cured of these cancers by cryotherapy. Liver cancer was controlled in 2 others, but these had spread of cancer to other parts of the body. There was 1 operative death, but no other serious complication from the procedure. Temperatures down to -40 C, produced repeatedly, gave better results than single or double exposures at -20 C. Treatment to -5 C is not successful, even when it is repeated.

0156 LOCALIZATION OF THE ENZYMES OF KETOGENESIS IN RAT LIVER MITOCHONDRIA.

(E.) Chapman, M. J.; Miller, L. R.; Ontko, J. A. (Oklahoma Med. Res. Fdn., Oklahoma City). *J. Cell Biol.* 58(2):284-306, 1973.

The localization of the enzymes of ketogenesis in isolated rat liver mitochondria was investigated. Mitochondrial subfractions were isolated after disruption of this subcellular organelle by hypotonic lysis in water, which permitted the ultracentrifugal separation of the soluble and membranous compartments of the mitochondrion, or by a procedure involving swelling, contraction, and ultrasonic treatment, which permitted the isolation from discontinuous sucrose gradients of subfractions rich in intermembrane space protein, outer membrane, and inner membrane-matrix particles. Invariably present were 2 membrane subfractions seen as distinct bands at the lower interface of the discontinuous gradient. The upper of the 2 bands was a highly purified preparation of outer mitochondrial membrane. From inner membrane-matrix particles after hypotonic treatment, subfractions rich in matrix and in inner membrane were isolated. The content of the various mitochondrial compartments in all subfractions was assessed from their enzymic and electron microscopic characteristics. The ketogenic activity of each subfraction was determined by its capacity to form ketone bodies from acetyl coenzyme A (CoA). This activity was markedly enhanced by dithiothreitol. These measurements of ketone body formation, together with assays of individual enzymes of the ketogenic pathway, show that thiolase, B-hydroxy-B-methylglutaryl CoA (HMGCoA) synthase, and HMGCoA cleavage enzyme are localized in the matrix of the inner membrane-matrix particles. Ketone body formation rates indicate that the HMGCoA synthase is the rate-limiting enzyme of the pathway in subfractions of high matrix content. Studies with sodium chloride indicate that a large portion of the HMGCoA synthase, which remains present in membrane subfractions derived from water-treated mitochondria, is bound by ionic interaction to component(s) of the membrane.

0157 METABOLISM OF ADRENALINE IN THE ISOLATED PERFUSED LIVER OF THE RAT.

(E.) Lightman, S. L.; Hems, D. A. (Middlesex Hosp. Med. Sch., London, England). *Biochem. Pharmacol.* 22(19): 2419-2423, 1973.

Epinephrine uptake and metabolism were studied in perfused livers of Sprague-Dawley rats. Epinephrine was rapidly removed from the perfusion medium but did not accumulate in the liver. Even after 2-hr perfusions with 10-50 µg/ml epinephrine, the concentration in the liver was only 0.1-0.3 µg/g. However, metabolites of epinephrine appeared in the liver and their concentration soon exceeded that of the epinephrine in the medium. The concentration of epinephrine metabolites was directly proportional to duration of the perfusion and epinephrine concentration in the medium. In a 30-min perfusion, 300 µg epinephrine was passed through liver; about 40-50 µg of metabolites accumulated in the liver and about 120 µg emerged in the effluent medium. The accumulation of epinephrine metabolites in liver and the removal of epinephrine from the perfusion medium were markedly reduced by the presence of corticosterone (10 µg/ml) in the medium. In this situation, there was no detectable epinephrine accumulation in liver, indicating that corticosterone inhibited the entry of the catecholamine into the liver, rather than the enzymes involved in epinephrine metabolism.

0158 S-ADENOSYLMETHIONINE: GUANIDINOACETATE N-METHYLTRANSFERASE ACTIVITIES IN LIVERS FROM RATS WITH HORMONAL DEFICIENCIES OR EXCESSES.

(E.) Carlson, M.; Van Pilsum, J. F. (Med. Sch., Univ. Minnesota, Minneapolis). *Proc. Soc. Exp. Biol. Med.* 143(4):1256-1259, 1973.

S-Adenosylmethionine: guanidinoacetate *N*-methyltransferase (GA-methyltransferase) activities were determined in livers from rats after removal of adrenals, pituitaries, gonads, or thyroids and parathyroids. Similar determinations were made in livers from intact rats given large doses of insulin, estradiol, testosterone, cortisol, thyroxine, or growth hormone. The only statistically significant differences were between the activities of livers from intact rats and the slightly lower activities of livers from rats with their thyroid and parathyroid glands removed or from intact rats given large doses of either testosterone, thyroxine, or growth hormone. Liver GA-methyltransferase activities were unaffected by replacement of either thyroxine to thyroidectomized rats, growth hormone to hypophysectomized rats, or testosterone or estradiol to castrated rats. Therefore, direct hormonal regulation of rat liver GA-methyltransferase is contraindicated. The second enzyme involved in creatine synthesis (GA-methyltransferase), therefore, differs greatly from the first enzyme (arginine: glycine transamidinase) in that transamidinase activities were reported earlier to be altered markedly by removal of certain endocrine glands or by injections of large doses of certain hormones into intact rats.

0159 ENZYMATIC AND METABOLIC STUDIES ON CARBOHYDRATE AND AMINO ACID METABOLISM IN RAT LIVER DURING ACUTE URAEMIA.

(E.) Maier, K. P.; Hoppe-Seyler, G.; Frohlich, J.; Talke, H.; Schollmeyer, P.; Gerok, W. (Dept. Internal Med., Univ. Frieburg, Germany). *Eur. J. Clin. Invest.* 3(3): 201-207, 1973.

Enzyme activities of the glycolytic, gluconeogenic, and hexose monophosphate pathways were measured in the liver of starved female albino Sprague-Dawley rats 12 and 48 hr after bilateral nephrectomy. Control experiments revealed that enzyme activities were altered because of starvation, not uremia. Alanine-aminotransferase and aspartate-amino-transferase activities were significantly elevated in rat liver 48 hr after nephrectomy when compared with sham-operated controls. Concentrations of the gluconeogenic intermediates 3-phosphoglyceric acid, pyruvate, phosphoenolpyruvate, and glucose-6-phosphate were significantly higher in the liver of uremic animals. Amino acid analysis showed only L-alanine concentration was increased. It is suggested that the inhibition of pyruvate degradation caused the elevated content of pyruvate in the liver during acute uremia. Together with the elevated pyruvate concentration the L-alanine increase could be a consequence of the equilibrium of the alanine-aminotransferase reaction; the apparent equilibrium concentration of the reaction is not changed by uremia. Increased activities of the transaminases and the elevated concentrations of the other metabolites measured might indicate that enhanced gluconeogenesis from substrates other than pyruvate occurs in the liver of nephrectomized rats.

0160 ETHANOL AND ACETALDEHYDE METABOLISM IN RAT STRAINS GENETICALLY SELECTED FOR THEIR ETHANOL PREFERENCE. *(E.)* Eriksson, C. J. P. (Res. Lab. State Alcohol Monopoly, Helsinki, Finland). *Biochem. Pharmacol.* 22(18):2283-2292, 1973.

Ethanol and acetaldehyde metabolism were studied in both sexes in rat strains genetically selected for their ethanol preference. The strains are denoted by ANA (Alko, Non-Alcohol), which prefers water to a 10% (v/v) ethanol solution, and AA (Aldo, Alcohol), which prefers the ethanol solution. Peripheral blood and freeze-stopped livers were used for the *in vivo* studies. A once-through perfusion technique was applied so that ethanol and acetaldehyde oxidation, the cytoplasmic redox state and oxygen consumption could be measured in the same liver. There was a higher rate of ethanol oxidation and oxygen consumption in female AA rats compared with the ANA strain. Female rats of both strains had more rapid ethanol oxidation and oxygen consumption compared with the respective males. The AA strain displayed a significantly lower level of acetaldehyde during ethanol oxidation than did the ANA strain. On comparison of the liver acetaldehyde concentrations with the mitochondrial reduced nicotinamide adenine dinucleotide/reduced adenine dinucleotide (NADH/NAD) ratio, calculated from the 3-hydroxybutyrate/acetoacetate ratio, strain correlations were observed in both sexes, the ANA strain, with higher acetaldehyde having a lower 3-hydroxybutyrate/acetoacetate ratio than the AA strain, with lower acetaldehyde. Strain differences in acetaldehyde oxidation must result from differences in the aldehyde dehydrogenase activity. The AA strain apparently has a higher activity, inducing more rapid oxidation of acetaldehyde, which in turn causes a greater increase in the mitochondrial NADH/NAD ratio. The higher acetaldehyde output during ethanol oxidation in the ANA strain suggests a greater inhibitory influence on the brain metabolism, a factor which could decisively affect behavior in respect of ethanol preference.

0161 EFFECTS OF PROTEIN-CALORIE MALNUTRITION ON DRUG METABOLISM IN RAT LIVER MICROSOMES. *(E.)* Anthony, L. E. (Univ. Texas Southwestern Med. Sch., Dallas). *J. Nutr.* 103(6):811-820, 1973.

The effect of protein-calorie malnutrition in young male Holtzman rats on the liver microsomal cytochrome P-450 enzyme system functional in the oxidative metabolism of many drugs and endogenous substrates was studied. *In vitro* drug metabolism (ethylmorphine *N*-demethylation) was markedly reduced with liver microsomes from rats fed a low protein diet. Upon addition of hexobarbital, a Type I substrate, hepatic microsomes from these animals showed a much less intense spectral change than microsomes from well-fed age controls. The concentration of cytochrome P-450 was reduced while cytochrome b_5 concentration, reduced nicotinamide adenine dinucleotide phosphate (NADPH)-cytochrome *c* reductase activity, and NADPH-cytochrome P-450 reductase activity were well maintained. Administration of phenobarbital, a known inducer of the hepatic cytochrome P-450 system, increased cytochrome P-450 content, NADPH-cytochrome *c* reductase activity, NADPH-cytochrome P-450 reductase activity, oxidative drug metabolism, and the magnitude of the Type I spectral change. The findings suggest that there is reduced binding of substrates to cytochrome P-450 preceeding enzymic oxidation accounting for the reduced *in vitro* drug metabolism in microsomes from rats fed low protein diets. The observation that oxidative drug metabolism is markedly reduced in young rats on diets similar in protein value to diets eaten by children with protein-calorie malnutrition suggests that humans may metabolize foreign compounds at a greatly decreased rate.

0162 THE EFFECT OF MILD HYPOTHERMIA IN CCl_4 TOXIC HEPATITIS (HISTOLOGIC AND FUNCTIONAL STUDY). *(E.)* Bartsokas, S. C.; Papadimitriou, D. G.; Papacharalampous, N. X.; Varonos, D. (Inst. Pathol. Physiol., Univ. Athens, Greece). *Acta Hepatogastroenterol.* 20(4):275-282, 1973.

Hepatic lesions were established and liver function was impaired in adult rabbits 12 hr after carbon tetrachloride (0.6 ml/kg) administration by stomach tube. At this time hypothermia of 31-32 C for 12 or more hr, with and without the rewarming of animals, resulted in an histologic protection practically analogous to the duration of hypothermia; and the liver function was preserved at nearly normal levels. Histologic findings suggest that protective action of hypothermia is exerted through some other mechanism than that of various chemical compounds used to inhibit carbon tetrachloride toxicity.

0163 IMMUNOLOGICAL ASSESSMENT OF MICE WITH CHRONIC JAUNDICE AND RUNTING INDUCED BY REOVIRUS 3. *(E.)* Walters, M. L.; Stanley, N. F.; Dawkins, R. L.; Alpers, M. P. (Dept. Microbiol., Univ. Western Australia, Perth, Australia). *Br. J. Exp. Pathol.* 54(2):329-345, 1973.

Following acute neonatal infection with reovirus 3 in mice of Prince Henry, Balb/c, and C57Bl strains, 8.7% of mice surviving to 22 days developed a syndrome of chronic jaundice and runting. In 1.6% the syndrome persisted beyond 60 days. Immune responses, both humoral and cell-mediated, of these mice with the persisting chronic syndrome were normal or enhanced. Serum immunoglobulin levels were raised. Anti-smooth muscle antibody was commonly found beyond 100 days of age and there was a low titer of hemagglutinating autoantibody; however, no evidence for an early autoaggressive pathogenesis of the syndrome was found. Neither was there evidence of persistence of infectious reovirus or reovirus antigen in chronically affected tissues. The syndrome closely resembles active chronic hepatitis in man. The initial acute infection with reovirus 3 is essential for the production of the persisting chronic disease, but neither infectious virus nor viral antigen could be detected at this stage.

0164 MORPHOMETRIC STUDY ON THE DISTRIBUTION OF LIVER NECROSIS IN EXPERIMENTAL MURINE HEPATITIS BY MHV-3 VIRUS. *(E.)*

Piccinino, F.; Sagnelli, E. (Clin. Infect. Dis., Univ. Naples, Italy). *Acta Hepatogastroenterol.* 20(4):299-302, 1973.

The distribution of necrosis in the whole liver affected by murine hepatitis caused by MHV-3 virus, used as an experimental model in the study of human viral hepatitis was studied. A precise morphometric-photographic method was used to evaluate the extent of liver necrosis in the histological sections from different liver zones. No significant statistical differences were found in necrotic damage observed, either among the 4 lobules of mouse liver, or among sections at different distances from the porta hepatis. The frequency distribution of necrosis in 130 small areas of liver tissue, selected randomly showed an approximately normal distribution and a small deviation from the mode. This regular distribution of necrotic damage observed in the liver with murine hepatitis suggests that in human viral hepatitis the histological examination of a small area of the damaged liver may be used to predict the actual extent of the necrosis in the whole liver.

0165 INFLUENCE OF ANAESTHESIA WITH VOLATILE AGENTS ON THE EQUINE LIVER. *(E.)*

Lees, P.; Mullen, P. A.; Tavernor, W. D. (Roy. Vet. Coll. Field Stn., Hatfield, England). *Br. J. Anaesth.* 45(6):570-578, 1973.

Anesthesia was induced in 6 yearling ponies with thiopentone sodium (10 mg/kg, i.v.) and maintained for 2 hrs with halothane-oxygen in the 1st series of experiments and with ether/oxygen in a 2nd series. The influence of these anesthetic procedures on liver function was assessed by several techniques. Measurements of BSP clearance and serum protein concentrations gave no indication of altered liver function in either series. Thiopentone-halothane anesthesia also for 2 hr with halothane/oxygen in the 1st series of experiments and with ether-anaesthesia was followed by slight and transient liver cell damage, indicated by rises in serum activities of liver-rich enzymes. Histopathological changes, indicative of slight liver damage, occurred in all animals but the nature of the changes was different and characteristic for each series.

0166 THE HYPOCALCEMIC EFFECT OF ETHYL ALCOHOL IN RATS AND DOGS. *(E.)*

Peng, T. C.; Cooper, C. W.; Munson, P. L. (Univ. North Carolina, Sch. Med., Chapel Hill). *Endocrinology* 91(2):586-593, 1972.

Ethyl alcohol (2-8 g/kg, p.o.) produced a rapid and sustained hypocalcemia in rats and dogs. The rapid onset (within 30 min) and the long duration (at least 5 hr) of hypocalcemia in rats after alcohol were similar to those observed with urethane. In control experiments, addition of alcohol to rat serum did not interfere with the analytical method for measurement of calcium. No changes in blood pH or total serum proteins occurred. The hypocalcemic effect of alcohol was not due to increased loss of urinary calcium, for this effect was retained after acute nephrectomy and direct measurement of urine calcium revealed that ethanol decreased rather than increased total urinary calcium during a 3-hr period after treatment. The hypocalcemic action of alcohol differed from that of thyrocalcitonin in that the hypocalcemia caused by alcohol was not associated with hypophosphatemia, and the maximum hypocalcemic effect of alcohol in rats was only 10-15% in contrast to the 30-40% fall in serum calcium which can be produced by thyrocalcitonin. The hypocalcemic effect of alcohol was evident after acute removal of the thyroid and parathyroid glands. Therefore, the effect of alcohol was not mediated by increased secretion of thyrocalcitonin or by suppression of secretion of parathyroid hormone. Experiments using ^{45}Ca showed that alcohol caused a movement of calcium out of blood and most likely, into bone tissue. The coincidence between the occurrence of hypocalcemia and of anesthesia after large doses of alcohol suggests that neural effects of alcohol and its ability to lower serum calcium may be interrelated.

0167 GROWTH HORMONE MODULATION OF LIVER DRUG METABOLIC ENZYME ACTIVITY IN THE RAT. II. SPECIFICITY OF THE HORMONE EFFECT. *(E.)*

Wilson, J. T. (Vanderbilt Univ., Med. Sch., Nashville, Tenn.). *Proc. Soc. Exp. Biol. Med.* 143(4): 978-985, 1973.

The specificity of growth hormone (GH) on liver drug metabolic enzyme activity was examined by injecting male Fischer rats s.c. with one of three hormones [GH, prolactin, or human chorionic somatomammotropin (HCS)] known to have similar structural and biological characteristics, and by treating animals with nonhormonal polypeptides (albumin or globulin) or an amino acid mixture similar in composition to the amino acid content of human GH. The liver metabolism of hexobarbital, ethylmorphine, aniline and *p*-nitrobenzoic acid (PNBA) and the rate and extent of cytochrome P-450 reduction showed a dose-dependent decrease following injection of GH. Boiling the GH reduced its effectiveness. With the exception of ethylmorphine and PNBA metabolism, prolactin did not decrease activity of this metabolic system. One dose of HCS (ZMS) slightly decreased the metabolism of hexobarbital and slightly increased that of aminopyrine. The spectrum of effects of GH on the overall rate of drug metabolism and on components of the microsomal cytochrome P-450 system could not be reproduced with the nonhormonal polypeptides or with the amino acid mixture. It is concluded that, within the dose and time periods used for this study, (injection 48 and 40 hr prior to *in vitro* assay), the decreased steady-state level of liver drug metabolism is a relatively specific action of GH in the rat.

0168 DECREASED TOXICITY OF DIMETHYLNITROSAMINE IN RATS AFTER TREATMENT WITH CARBON TETRACHLORIDE. *(E.)* Pound, A. W.; Horn, L.; Lawson, T. A. (Queensland Univ., Med. Sch., Brisbane, Australia). *Pathology* 5(3):223-242, 1973.

A nonlethal dose of carbon tetrachloride (CCl_4) that produced necrosis in the liver, followed by regeneration, protected male Sprague-Dawley rats from the toxic effects of dimethylnitrosamine (DMN) for 48-60 hr. At 42 hr when DNA synthesis was at a maximum, the LD_{50} of DMN was increased from 27.2 to 42.5 mg/kg. DMN-demethylase in the liver fell sharply by 6 hr after CCl_4, maintained a low level for 42-60 hr, and returned to normal by 72 hr. No change occurred in the level of the DMN-demethylase in the kidney. When DMN was given 42 hr after CCl_4, the acute cellular changes and necrosis usually produced were not superimposed on the lesions produced by the CCl_4, but when the interval was 60 hr, acute necrosis was again produced in the liver. On the other hand the minor degree of necrosis in the distal convoluted tubules of the kidneys produced by DMN was much increased when it was administered 42 hr after a dose of CCl_4 but not when given after 60 hr.

)169 COMPARISON OF THE CHOLERETIC PROPERTIES OF BILE ACIDS. *(E.)* Klaassen, C. D. (Univ. ansas Med. Ctr., Kansas City). *Eur. J. Pharmacol.* 3(3):270-275, 1973.

holic acid, chenodeoxycholic, and deoxycholic acid nd their taurine and glycine conjugates were comared as to their choleretic properties and ability o form micelles. All acids studied stimulated ile production in mongrel dogs at a dosage of 55 M/kg i.v. Cholic acid increased bile volume 5-fold 595 µl/kg) within 10-20 min after administration. lycocholic and taurocholic acid resulted in volume ncreases of 428 and 450 µl/kg, resp. Chenodeoxyholic acid increased bile flow 4-fold, whereas aurochenodeoxycholic produced a 3-fold increase and lycodeoxycholic acid only a 2-fold increase. Deoxyholic and taurodeoxycholic acid both increased ile flow 4-fold *versus* a 2-fold increase for glydeoxycholic acid. Thus, the glycine and taurine onjugates, with the exception of taurodeoxycholic cid, for all bile acids were less choleretic than e parent compounds. These results indicate that ere is not a good inverse correlation between the icellar properties of bile acids and their ability o increase bile flow. Either the micellar operties of bile acids are different in bile from ose reported in other experimental conditions, or e choleresis produced by the various bile acids is not due simply to the osmotic properties of the bile acids in the canaliculi. It is also possible that bile acids alter the bile salt-independent fraction of bile formation.

0170 EFFECTS OF ETHANOL ON AMINO-ACID UPTAKE AND UTILIZATION BY THE LIVER AND OTHER ORGANS OF RATS. *(E.)* Chambers, J. W.; Piccirillo, V. J. (Med. Coll. Virginia, Richmond). *Q. J. Stud. Alcohol* 34(3):707-717, 1973.

Isolated livers from male Sprague-Dawley rats were perfused with 20 ml defibrinated rat blood and 80 ml Krebs bicarbonate buffer, the perfusate containing about 100 ml glucose and 1000 U heparin. Ethanol (200 mg/100 ml perfusate) did not significantly decrease leucine uptake by the isolated perfused rat liver, but did decrease the uptake of alanine by 34.0% and the uptake of α-aminoisobutyric acid by 40%. It is suggested that an increase in the concentration of reduced nicotinamide adenine dinucleotide is responsible for the inhibition of amino-acid uptake. The fact that the addition of pyruvate or fructose to the perfusate reverses this inhibition may only represent a more rapid destruction of the alcohol. Incorporation of radioactive alanine into protein in the isolated perfused liver was inhibited 35% by ethanol. Incorporation of labeled leucine in the presence of 200 mg ethanol was significantly, though not as greatly, inhibited. Urea production by the isolated perfused rat liver was inhibited by 200 mg ethanol whether or not utilizable amino acids were added to the perfusate. It is suggested that a decrease in the conversion of amino acids to keto acids, as implied by reduced urea production, causes a decrease in gluconegenesis which may be responsible in part for the reduced glucose production. Administration of ethanol (3g/kg) to the intact rat inhibited the uptake of α-aminoisobutyric acid in the liver by 23.9%, in the gut by 50.6%, and in the kidney by 21.3%. The considerable inhibition of α-aminoisobutyric uptake into gut tissue may reflect a direct toxic effect of high concentration of alcohol as well as a reduction of uptake caused by increases in reduced nucleotide due to ethanol oxidation. These data indicate that the inhibition of uptake was related to the shift in the $NAD:NADH_2$ ratio resulting from the oxidation of ethanol.

0171 HEPATIC GALACTOSE METABOLISM AFTER SIDE-TO-SIDE PORTACAVAL SHUNT. *(E.)* Smith, G. W.; Hulbanni, S. V. (Univ. Virginia Sch. Med., Charlottesville). *J. Surg. Res.* 15(3):163-167, 1973.

Baseline studies for liver blood flow, oxygen consumption, and galactose utilization were performed in 35 mongrel dogs. In 6 others only blood flow and galactose data were obtained. In all 41 animals a side-to-side portacaval shunt was then created. After 45 min, hepatic artery and portal flows were recorded and heparinized blood samples were obtained from the hepatic artery, portal vein, hepatic vein, and inferior vena cava. These samples were analyzed for oxygen content. A galactose load of 500 mg/kg was administered directly into the portal vein and 15 min later heparinized blood samples for galactose were withdrawn from the hepatic artery, portal vein, hepatic vein, and inferior vena cava. Galactose utilization by the liver was investigated in 13 animals, on the basis of liver weight. A 62% reduction from 906 to 350 cu cm/kg/min in total liver blood flow was noted after shunt along with a drop in portal vein flow from 628 to 82 cu cm/kg/min. No compensatory increase in hepatic artery flow occurred. Hepatic oxygen consumption decreased by 27% from 26.2 to 19.1 ml/min. Galactose utilization reduced from 63.3 to 0.3 mg/min after shunt. Expressed in terms of liver weight, galactose utilization fell from 15.7 to 2.3 mg/g liver/hr. This investigation points to significant impairment of hepatic galactose metabolism by a side-to-side portacaval shunt in the dog.

0172 PLASMA AND BRAIN TRYPTOPHAN CHANGES IN EXPERIMENTAL ACUTE HEPATIC FAILURE. *(E.)* Curzon, G.; Kantamanenin, B. D.; Winch, J.; Rojas-Bueno, A.; Murray-Lyon, I. M.; Williams, R. (Inst. Neurol., London, England). *J. Neurochem.* 21(1):137-145, 1973.

Hepatic devascularization of pigs rendered them an acceptable experimental model for acute hepatic failure in man. Liver function was grossly impaired after operation and movements became incoordinated and coma ensued. Most animals died 5-1/2 to 8-1/2 hr after operation. Plasma unesterified fatty acid and free (but not total) tryptophan concentrations rose markedly after operation and correlated significantly with each other. Brain tryptophan concentration increased and correlated significantly with plasma free tryptophan concentration. Increased tryptophan was found in the 4 brain regions studied (hypothalamus, thalamus, caudate, and cortex) and was associated with raised 5-hydroxytryptamine turnover as indicated by raised 5-hydroxyindolylacetic acid concentration. The raised free tryptophan concentration in the operated animals is important since it is this fraction which is available for transport into the brain. Striking elevations of free plasma tryptophan were found in this study and also in some patients with acute hepatic failure.

0173 THE EFFECTS OF HALOTHANE ON METABOLISM AND CALCIUM UPTAKE IN MITOCHONDRIA OF THE RAT LIVER AND BRAIN. *(E.)* Rosenberg, H.; Haugaard, N. (Tufts Univ. Sch. Med., Boston, Mass.). *Anesthesiology* 39(1):44-53, 1973.

The actions of halothane on respiration of mitochondria prepared from liver and brain obtained from male Wistar rats and on the uptake of calcium by brain mitochondria were studied *in vitro*. Halothane markedly inhibited ADP-stimulated respiration of both liver and brain mitochondria. With glutamate the sensitivity to inhibition by halothane was greater than with succinate as substrate. Halothane inhibits oxidative phosphorylation and, except in some circumstances at very high concentrations, is not an uncoupling agent. In liver mitochondria halothane effectively inhibited the increases in rates of respiration produced by calcium and phosphate when glutamate was the respiratory substrate. In the presence of succinate this effect was not seen with mitochondria respiring. Halothane inhibited calcium uptake by brain mitochondria when the mitochondria were incubated in the presence of ATP, ATP plus glutamate and phosphate, and ATP plus succinate and phosphate. The inhibitory action of halothane was preceded in time by a temporary stimulation of calcium uptake with succinate as the substrate. Additional experimentation is suggested to determine whether halothane influences calcium movements in the brain *in vivo* and whether such actions of a general anesthetic are important in the production of the anesthetic state in the intact organism.

0174 THE STIMULATION OF LIPID PEROXIDATION PRODUCED BY DIMETHYLNITROSAMINE IN RAT LIVER MICROSOMES IN VITRO: THE EFFECTS OF PROMETHAZINE AND INHIBITORS OF DRUG METABOLISM, AND A COMPARISON WITH PREVIOUS STUDIES USING CARBON TETRACHLORIDE. *(E.)* Jose, P. J.; Slater, T. F. (Dept. Biochem., Univ. Brunel, Uxbridge, England). *Xenobiotica* 3(6):357-366, 1973.

Addition of dimethylnitrosamine (3 μliter) to liver microsomal suspensions prepared from female albino rats increased the rate of reduced nictotinamide adenine dinucleotide phosphate (NADPH)-linked lipid peroxidation by 11%. The stimulatory effects of dimethylnitrosamine on microsomal lipid peroxidation were decreased by inhibitors of microsomal oxidative drug metabolism, carbon monoxide (5-min. gassing), β-diethylaminoethyl-3,3-diphenylpropylacetate (100 μM), and p-chloromercuribenzoate (84 μM) and by promethazine, but were not altered by the substitution of the NADPH by an equimolar concn. of reduced nictotinamide adenine dinucleotide. Dimethylnitrosamine interacts with cytochrome P-450 as shown by the use of difference spectra, and the stimulation of lipid peroxidation probably depends upon metabolism of the dimethylnitrosamine at this site. It is suggested that the lipoperoxidative properties of dimethylnitrosamine may be due to free radical metabolites, since promethazine did not inhibit oxidative peroxidation by the compound. However, the sensitivity of any such free radical metabolites to the scavenging actions of promethazine is less than that of metabolites of carbon tetrachloride.

0175 COMPARISON OF ACTIVITIES OF DRUG-METABOLIZING ENZYMES IN HUMAN FETAL AND ADULT LIVERS. *(E.)* Pelkonen, O.; Kaltiala, M. H.; Larmi, T. K. I.; Karki, N. T. (Dept. Pharmocol., Univ. Oulu, Finland). *Clin. Pharmacol. Ther.* 14(5):840-846, 1973.

The *in vitro* capacity of human fetal liver to metabolize 3,4-benzypyrene, (10 mg adult and 50 mg fetal) aniline (50 mg), aminopyrine (50 mg), and hexobarbital (50 and 100 mg) was lower than that of human adult liver from patients with uncomplicated cholelithiasis. Fetal liver drug-metabolizing capacity, expressed as percentages of adult values, was 2.4, 27.8, 32.0, and 36.1% resp., for the following substrates; benzypyrine hydroxylase, aminopyrine demethylase, aniline hydroxylase, and hexobarbital oxidase. Cytochrome P-450 content and nicotinamide adenine dinucleotide phosphate cytochrome c reductase activity in fetal liver microsomes also reflected the lower drug-metabolizing activity, being 27.4 and 49.2%, resp., of adult values. Microsomal protein content was about 26 mg/g wet weight in fetal liver and about 35 mg/g in adult liver. Recovery of microsomes was 40% to 60% in both fetal and adult livers. All parameters studied exhibited 3- to 11-fold variation. Thus the *in vitro* ability of the human fetal liver to metabolize foreign compounds seems lower than that of the human adult liver. However, if drug metabolite transfer through the placenta is slower than the transfer of the original drug, there may be an accumulation of the metabolites on the fetal side.

0176 EFFECTS OF VARIOUS CENTRALLY ACTIVE DRUGS ON HEPATIC MICROSOMAL ENZYMES: A COMPARATIVE STUDY. *(E.)* Valerino, D. M.; Vesell, E. S.; Johnson, A. L.; Aurori, K. C. (Milton S. Hershey Med. Ctr., Hershey, Pa.). *Drug Metab. Disposition.* 1(5):669-678, 1973.

The extent to which 6 centrally active drugs stimulated hepatic microsomal enzymes of mature male Sprague-Dawley rats was compared. Of the 3 parameters examined, diphenylhydantoin (50 and 100 mg/kg, i.p.) enhanced only ethylmorphine N-demethylase activity and cytochrome P-450 content, whereas the other 5 drugs stimulated aniline hydroxylase activity as well. By measuring changes in these microsomal systems after 3, 7, and 14 of drug administration, the stimulatory capacities of the 6 drugs were determined and compared. The stimulatory capacity of each drug was dose related and varied considerably in the temporal pattern exhibited. Near maximal stimulation of all 3 parameters occurred after 3 daily i.p. injections of phenobarbital (25 and 50 mg/kg), whereas 8 and 16 mg/kg chlorpromazine 40 mg/kg. diazepam 220 mg/kg meprobamate, and diphenylhydantoin produced maximal stimulatory responses only after 7-14 daily injections. Daily administration of high doses of diphenylhydantoin or ethanol decreased the activity or content of at least 1 of the 3 microsomal systems under investigation. On a molar basis, phenobarbital was the most potent stimulatory agent after 3 daily injections; at this time the other 5 drugs were generally similar to one another. In the doses employed in this study, only phenobarbital produced more than 2-fold stimulation of all 3 microsomal parameters. After 7 days of administration, 50 and 100 mg/kg diphenylhydantoin elevated ethylmorphine N-demethylase activity 240% above control values.

0177 EFFECT OF D-PENICILLAMINE ON THE GALACTOSAMINE HEPATITIS MODEL IN RATS. *(Ger.)* Habersang, S.; Kozlik, V.; Leuschner, F.; von Schlichtegroll, A. (Chemiewerk Homburg, Frankfurt/Main, Germany). *Arzneim. Forsch.* 23(1):56-57, 1973.

Liver damage was inhibited or alleviated in Sprague-Dawley rats by administering D-penicillamine (50, 100, or 200 mg/kg/day p.o.) for 21 days before injection of galactosamine hydrochloride (6 injections of 250 mg/kg i.p. each) in a 32-hr period. Rats treated with D-penicillamine had significantly higher liver contents of uridine phosphates and significantly lower SGOT, SGPT, and bilirubin values than rats given galactosamine alone. D-penicillamine had a similar effect on lipid metabolism: in doses of 100 and 200 mg/kg/day, it significantly reduced total and free serum cholesterol and total serum lipid levels in a dose-dependent manner. No changes occurred in triglycerides, total lipids, or phosphatides in the liver.

0178 INFLUENCE OF DIET ON METABOLISM AND EXCRETION OF BROMOSULPHTHALEIN SODIUM. *(E.)* Ware, A. T.; Combes, B. (Univ. Texas Southwestern Med. Sch., Dallas). *Am. J. Physiol.* 225(6):1260-1264, 1973.

The effect of a 48-hr fast on the hepatic components of the BSP conjugating system was studied in female Sprague-Dawley rats and contrasted with previously observed changes induced in animals fed a protein-free diet (PF) for 48 hr. Fasting causes a 25% fall in hepatic glutathione (GSH) content compared to a 70% decrease in PF rats. BSP conjugating enzyme activity fell by about 20% with both dietary regimens. *In vivo* studies demonstrated: normal BSP excretion in both groups following conjugated BSP infusion; and a fall in maximal BSP excretion (BSP T_m) in PF animals given free BSP. This decrease in BSP T_m is due to decreased excretion of conjugated BSP, despite hepatic levels of conjugated BSP equal to those attained during infusion with conjugated BSP, and associated with a decrease in the proportion of conjugated BSP relative to free BSP in the liver. The presence of free BSP in the liver inhibits the excretion of conjugated BSP.

0179 ω-HYDROXYLATION OF STEROID SIDE-CHAIN IN BIOSYNTHESIS OF BILE ACIDS. *(E.)* Bjorkhem, I.; Gustafsson, J. (Dept. Chem., Karolinska Inst., Stockholm, Sweden). *Eur. J. Biochem.* 36(1):201-212, 1973.

ω-Hydroxylation (26-hydroxylation) of various C_{27}-steroids by the microsomal and mitochondrial fraction was studied. Assay conditions for the microsomal 26-hydroxylation were determined with 5β-cholestane-3α,7α-diol as substrate. Reduced nicotinamide adenine dinucleotide phosphate (NADPH) was the required cofactor. Reduced nicotinamide adenine dinucleotide (NADH) stimulated the hydroxylation at suboptimal concentrations of NADPH. Carbon monoxide inhibited the microsomal 26-hydroxylation about 85%. Treatment with phenobarbital slowed the reaction rate from 1.83 to 0.40 mmol/mg protein/20 min, starvation or biliary drainage had no significant effect. The rates of microsomal 26-hydroxylation of different C_{27}-steroids expressed in μmol/mg protein/20 min were cholesterol, <0.1; 5-cholestene-3β,7α-diol, <0.1 7α-hydroxy-4-cholestene-3-one, 0.3; 7α,12α-dihydroxy-4-cholesten-3-one, 0.9; 5β-cholestane-3α,7α-diol, 1.8; 5β-cholestane-3α,7α,12α-triol, 2.7. Assay conditions for the mitochondrial 26-hydroxylation were determined with cholesterol and 5β-cholestane-3α,7α-diol as substrates. The rate of reaction was faster with an NADPH-generating system than with NADPH. Carbon monoxide inhibited the mitochondrial 26-hydroxylation about 95%. Biliary drainage inhibited the reaction whereas starvation or treatment with phenobarbital stimulated the reaction, but not significantly. The rates of mitochondrial 26-hydroxylation of different C_{27}-steroids expressed in nmol/mg protein/20 min were: cholesterol, 0.3; 5-cholestene-3β,7α-diol, 0.9; 7α-hydroxy-4-cholesten-3-one, 1.7; 7α,12α-dihydroxy-4-cholesten-3-one, 0.9; 5β-cholestane-3α,7α-diol, 0.9; 5β-cholestane-3α,7α,12α-triol, 2.0. The results are consistent with previously postulated pathways concerning biosynthesis of cholic acid and chenodeoxycholic acid in which 5β-cholestane-3α,7α,12α-triol and 5β-cholestane-3α,7α-biol, resp., are the main substrates for the 26-hydroxylase. It is suggested that pathways involving intermediary formation of 7α,26-dihydroxy-4-cholesten-3-one and 7α,12α,26-trihydroxy-4-cholesten-3-one are also of importance in the biosynthesis of bile acids.

0180 METABOLIC CONTROLS IN PRECANCEROUS LIVER. V. LOSS OF CONTROL OF CHOLESTEROL SYNTHESIS DURING FEEDING OF THE HEPATOCARCINOGEN 3'-METHYL-4-DIMETHYLAMINOAZOBENZENE. *(E.)* Horton, B. J.; Horton, J. D.; Sabine, J. R. (Waite Agric. Res. Inst., Adelaide, Australia). *Eur. J. Cancer* 9(8):573-576, 1973.

Dietary control of cholesterol synthesis in the livers of 50 male Hooded-Wistar rats was examined during the feeding of 3'-methyl-4-dimethyl-aminoazobenzene. Repeated tests were performed on the same animals. Synthesis was measured as plasma levels of 7-dehydrocholesterol following a single dose of trans-1, 4-bis (2-chlorobenzylaminomethyl) cyclohexane dihydrochloride, a drug which inhibits the conversion of 7-dehydrocholesterol to cholesterol. The 3'-methyl-4-dimethyl-aminoazobenzene feeding caused a small, but usually statistically significant, loss of dietary feedback control of hepatic cholesterol synthesis, evident after only 1 week on the carcinogenic diet. However, control rapidly returned to normal as soon as the carcinogen treatment was discontinued. The loss of control was similar to that reported for 3 other hepatocarcinogens, aflatoxin, N-2-fluorenylacetamide and ethionine.

0181 BILIARY EXCRETION OF NICOTINAMIDE RIBOSIDE. A POSSIBLE ROLE IN THE REGULATION OF HEPATIC PYRIDINE NUCLEOTIDE DYNAMICS. *(E.)* MacGregor, J. T.; Burkhalter, A. (Dept. Pharmacol., Univ. California, San Francisco). *Biochem. Pharmacol.* 22(21):2645-2658, 1973.

Female Sprague-Dawley rats fed approximately 5 mg/day/kg of ^{14}C-nicotinic acid excreted 10% of the daily ingested label in bile and 57% in urine. About 2/3 of the label in bile was present as nicotinamide riboside. Chemical analysis of nicotinamide riboside indicated that about 7 μmoles/day/kg were excreted into bile. Chemical and radiochemical analyses both indicated that biliary nicotinamide riboside excretion may account for a major fraction of the hepatic pyridine nucleotide turnover. Nicotinamide riboside was not detected in urine, while 1-methylnicotinamide was present in urine but not in bile. Of the daily dietary intake, 6.7% was excreted in bile as nicotinamide riboside while 19.6% was excreted in urine as 1-methylnicotinamide. After administration of nicotinic acid (150 mg/kg, i.p.) or nicotinamide (500 mg/kg, i.p.), the hepatic nicotinamide adenine dinucleotide (NAD$^+$) content increased 2 to 4-fold, accompanied by a marked increase in the turnover of this newly formed NAD$^+$. The biliary excretion of nicotinamide riboside increases up to 10 times during this period of increased hepatic NAD$^+$ turnover. The nicotinamide riboside excretion appeared related to the elevation of NAD$^+$ and was independent of whether nicotinic acid or nicotinamide was used as the precursor. Comparison of the biliary nicotinamide riboside excretion with published values for the urinary excretion of NAD$^+$ metabolites during a similar hepatic NAD$^+$ increase indicates that the biliary route may be a major pathway for hepatic NAD$^+$ metabolite elimination. 1-Methylnicotinamide was not found in bile unless very large i.v. doses were given to animals with ligated renal pedicles. It is suggested that the biliary system is important in pyridine nucleotide dynamics and that biliary nicotinamide riboside excretion may be related to the secretion of other organic cations into bile.

0182 THE EFFECT OF COPPER LOADING ON THE DISTRIBUTION OF COPPER IN RAT LIVER CYTOSOL. *(E.)* Bloomer, L. C.; Sourkes, T. L. (Dept. Psychiatry, McGill Univ., Montreal, Canada). *Biochem. Med.* 8(1):78-91, 1973.

Male Sprague-Dawley rats were given i.p. injections of copper (2.5 mg Cu^{2}/kg/day as copper sulfate in 0.9% NaCl) for 1-10 days. Copper in the total liver and cytosol were measured. In related experiments, copper (50 μg/g liver was added to the sucrose used to homogenize control livers. Copper accumulated predominantly in the particulate fractions of the liver after i.p. injection, whereas 46% of the copper added *in vitro* was found in the cytosol. The distribution of copper within the cytosol was different when copper was added *in vivo* or *in vitro*. In the former case, as much as 60% of the copper co-chromatographed with proteins of molecular weight 11,500-14,000 (C-peak proteins), in the latter case the added copper was bound to high molecular-weight proteins (>100,000). Copper loading favored the binding of copper to C-peak proteins in rat liver cytosol. At termination of copper injections the copper in the C-peak decreased exponentially. The protein content of copper-containing fractions was determined. A protein was identified which may act as a transport protein and whose copper content depends on the degree of copper balance in the rat; i.e., it varies with the total liver copper. Preliminary experiments suggest that copper may be bound to the protein in the cuprous form.

0183 MODIFICATIONS OF THE BILIARY EXCRETION OF BILIRUBIN GLUCURONIDE IN RATS WITH PORTACAVAL SHUNT: THE ROLE OF UDP-GLUCURONYL TRANSFERASE. *(E.)* Okolicsanyi, L.; Vassanelli, P.; Scremin, S.; Stella, G. D. (Pathol. Inst. Special Med., Padua, Italy). *Biomedicine* 19(6):253-256, 1973.

Bilirubin metabolism was investigated in 36 Sprague-Dawley rats 20 days after end-to-side protacaval anastomosis. An observed 10 min. delay in the excretion of injected pigment appeared to be related to decreased liver glucuronyltransferase activity caused by the portacaval shunt. Sodium phenobarbital (80 mg/kg, i.p.) administered days 17, 18 and 19 after intervention in 5 rats stimulated glucuronyltransferase activity, which reached the same values as in normal rats. Bilirubin excretion also returned to normal. Conjugated bilirubin injection gave an excretion curve similar to that observed in phenobarbital-pretreated rats. These results indicate that under the experimental conditions the decrease of glucuronyltransferase activity is important in determining the changes of bilirubin metabolism.

0184 FATTY ACID ACTIVATION AND ACYL TRANSFER IN RAT LIVER DURING CLOFIBRATE FEEDING. *(E.)* Daae, L. N.; Aas, M. (Inst. Clin. Biochem., Univ. Oslo, Norway). *Atherosclerosis* 17(3):389-400, 1973.

0185 EFFECT OF ANGIOTENSIN ON BLOOD PRESSURE IN NORMAL AND CIRRHOTIC RATS. *(E.)* Bala, S.; Sharma, P. L.; Garg, K. N. (Med. Coll., Rohtak, India). *Jap. J. Pharmacol.* 23(3):409-413, 1973.

0186 LIVER CIRRHOSIS IN RATS AFTER CHRONIC INTOXICATION WITH GALACTOSAMINE. *(Ger.)* Meyer-Burg, J.; Braun, J.; Kortge, P. (Seglitz Clin., Free Univ., Berlin, Germany). *Klin. Wochenschr.* 50: 263-264, 1972.

0187 LIQUID CRYSTALS IN HUMAN BILE. *(E.)* Olszewski, M. F.; Holzbach, R. T. (St. Luke's Hosp., Cleveland, Ohio). *Nature* 242(5396): 336-337, 1973.

0188 EFFECTS OF ANTIBIOTIC IONOPHORE, A23187, ON OXIDATIVE PHOSPHORYLATION AND CALCIUM TRANSPORT OF LIVER MITOCHONDRIA. *(E.)* Wong, D. T.; Wilkinson, J. R.; Hamill, R. L.; Horng, J. S. (Lilly Res. Labs., Eli Lilly and Co., Indianapolis, Ind.). *Arch. Biochem. Biophys.* 156(2):578-585, 1973.

0189 HEPATIC MICROSOMAL ENZYME INDUCTION. *(E.)* Brown Jr., B. R. (Univ. Arizona Coll. Med., Tucson). *Anesthesiology* 39(2):178-187, 1973.

0190 EFFECT OF VARIOUS NUCLEOTIDES ON THREONINE DEAMINASES IN RAT LIVER. *(It.)* Pagani, R.; Lusini, P.; Marinello, E. (Inst. Biochem., Univ. Siena, Italy). *Boll. Soc. Ital. Biol. Sper.* 48(21): 751-753, 1972.

0191 ISOLATION AND PERFUSION OF THE LIVER FOR CANCER CHEMOTHERAPY. *(E.)* Mulcare, R. J.; Solis, A.; Fortner, J. G. (Memorial Hosp. Cancer Allied Dis., New York, N.Y.). *J. Surg. Res.* 15(2): 87-95, 1973.

0192 SUBSTITUTION OF THE LIVER. III. FUNCTIONAL CAPACITY OF THE HOMOLOGOUSLY PERFUSED PIG LIVERS. *(E.)* Weber, M.; Bircher, J.; Hacki, W.; Strebel, H.; Scholi, E.; Pedrinis, E.; Preisig, R. (Dept. Clin. Pharmacol., Univ. Berne, Switzerland). *Biomedicine* 18(4):304-310, 1973.

See also, 0131, 0228, 0233, 0242, 0244, 0544, 0647, 0657.

SECRETION AND METABOLISM

Intestine

0193 BILE SALT METABOLISM AND THE COLON. *(E.)* Morris, J. S.; Low-Beer, T. S.; Heaton, K. W. (Roy. Free Hosp., London, England). *Scand. J. Gastroenterol.* 8(5):425-431, 1973.

The fate of ^{14}C-labeled sodium taurocholate in duodenal samples from 6 subjects (3 males and 3 females, aged 32-63 yr) with an ileostomy was studied. The diagnoses included ulcerative colitis in 5 cases, and intestinal polyposis in 1. Less radioactivity appeared in the form of deoxycholate conjugates in subjects with an ileostomy than in controls. The overall rate of loss of radioactivity was normal in those with an ileostomy, indicating that no malabsorption of bile salts occurred in the absence of a colon. In most ileostomy subjects, however, there was rapid deconjugation of bile salts. In these 2 groups of subjects and in 3 patients with an ileo-rectal anastomosis the relative proportions of glycocholate, glycochenodeoxycholate, and glycodeoxycholate were measured in duodenal aspirates. In subjects with an ileostomy little or no glycodeoxycholate was present, but in those with an ileo-rectal anastomosis glycodeoxycholate levels approached the normal range. These findings suggest that deoxycholate is formed in the colon and that bile salt recirculation is not impaired in the absence of the colon.

0194 HORMONAL CONTROL OF INTESTINAL ALKALINE PHOSPHATASE SECRETION IN THE DOG. *(E.)* Dyck, W. P.; Hall, F. F.; Ratliff, C. R. (Scott White Clin., Temple, Tex.). *Gastroenterology* 65(3):445-450, 1973.

Intestinal alkaline phosphatase was released into the perfused small intestinal lumen of the dog upon injection of secretin (4 U/kg, i.v.) and cholecystokinin (0.5-5 U/kg, i.v.). Since bile and pancreatic juice were excluded from the perfusion solution, a direct hormonal effect on the intestinal mucosa is considered responsible for the enzyme release. A simultaneous increase in the alkaline phosphatase activity of both mucosal tissue and perfusion solution after hormonal stimulation suggests a direct potentiaion of the secretory process rather than a simple washout phenomenon or increased enzyme extrusion through the mechanical effects of muscular contraction of the gut wall. The effect exerted by secretin on enzyme release was not as pronounced as that of cholecystokinin. Isoenzyme characterization studies, based on different susceptibilities to urea and L-phenylalanine inhibition and to heat inactivation, indicate similarities between canine and human intestinal alkaline phosphatase, and suggest that the mucosal and perfusion solution enzymes are identical.

0195 EFFECT OF IONIZING RADIATION ON FETUS. ACTIVITY OF SOME HYDROLYTIC ENZYMES IN THE SMALL INTESTINE OF RATS IRRADIATED DURING PRENATAL DEVELOPMENT. *(E.)* Trojczuk, D.; Owdiejczuk, R. (Med. Acad., Poznan, Poland). *Acta Physiol. Pol.* 23(4):711-718, 1973.

The effect of irradiation on the intestinal activity of glycolytic enzymes in the early period of postnatal development was investigated. Wistar rats were irradiated on the 18th day of uterine life with the dose of 186 rad. The activity of 2 glycolytic enzymes, β-fructofuranosidase and β-galactosidase, and 1 proteolytic enzyme, glycyl-leucine dipeptidase, was determined in the small intestine on the 1st, 10th, 20th, 25th, and 50th day of postnatal life. The total activity of enzymes in the intestinal homogenate and on the surface of the intestine was determined. Proteins were assessed simultaneously, and the enzyme activity was recalculated per 1 mg of protein or 100 mg of fresh tissue. The results show that irradiation of the rat fetus on the 18th day of embryonal life increased the β-fructofuranosidase, β-galactosidase, and glycyl-leucine dipeptidase activities in the small intestine epithelium. These disturbances began in the early postembryonic life and were of transient character. Normalization occurred in parallel with maturation of neurohormonal system.

0196 STARCH HYDROLYSIS IN MAN: AN INTRALUMINAL PROCESS NOT REQUIRING MEMBRANE DIGESTION. *(E.)* Fogel, M. R.; Gray, G. M. (Stanford Univ. Sch. Med., Calif.). *J. Appl. Physiol.* 35(2):263-267, 1973.

The relative contribution to starch hydrolysis of intraluminal amylase *versus* amylase adsorbed to the microvillous membrane was studied. Jejunal perfusion and test meal experiments were performed in 9 normal human subjects as well as in 5 patients (aged 33-54 yr) with exocrine pancreatic insufficiency, as these patients are generally assumed to have defective starch hydrolysis. Normal controls were able to hydrolyze 7.3 g of a 9.0 g infused starch load/hr to an average molecular weight of 610 g, whereas the patients could only hydrolyze 4.3 g/hr to an average molecular weight of 1836 g. The hydrolytic capacity of the intraluminal contents in both groups was more than adequate to explain the observed starch hydrolytic rate despite the fact that the patients had only 10% of the hydrolytic capacity of the control subjects. Starch given in a starch-protein-fat test meal was hydrolyzed rapidly enough to suggest that patients with exocrine pancreatic insufficiency should utilize starch-containing foods as a source of calories. In response to the test meal, the amount of amylase present in normal subject ranged from 1400-7000 U/ml, whereas in pancreatic insufficiency patients the range was 18-300 U/ml. Since the available intraluminal hydrolytic capacity is greatly in excess of that needed to account for the observed rates of starch hydrolysis in man, membrane digestion of starch is probably of secondary importance.

0197 IMMUNOGLOBULINS IN THE INTESTINAL CONTENT OF THE HUMAN FETUS WITH SPECIAL REFERENCE TO IgA. *(E.)* Petit, J. C.; Galinha, A.; Salomon, J. C. (Inst. Res. Sci. Cancer, Villejuif, France). *Eur. J. Immunol.* 3(6):373-375, 1973.

The gut walls and gut contents of 27 fetuses were analyzed for the presence of immunoglobulins. Secretory IgA was detected in 16 samples, IgM in 22 samples, IgG in 25 samples, while all 3 classes were detected in 16 samples. No IgA was found in the meconia of neonates, suggesting a transient synthesis during fetal life which is interrupted during the weeks before birth, followed by a reinduction of synthesis possibly related to stimulation by antigens in milk and intestinal flora. The assumption is made that the fetal environment is antigen-free and that early immunoglobulin production may be independent of antigenic stimulation. It is suggested that the immunoglobulins have an intrinsic fetal origin at about the 12th week of gestation, coinciding with the first step in the development of lymphoid tissues. These immunoglobulins are either evidence of an auto-immune response or they are devoid of specific activity. These observations on early immunoglobulin production in fetal gut support the theory that intestinal lymphoid tissue is a first-level lymphoid organ.

0198 QUANTITATIVE DISTRIBUTION OF SOME ENZYMES ALONG THE VILLI AND CRYPTS OF HUMAN SMALL INTESTINE. *(E.)*

Nordstrom, C.; Dahlqvist, A. (Dept. Nutr., Chem. Ctr., Lund, Sweden). *Scand. J. Gastroenterol.* 8(5):407-416, 1973.

A microdissection technique has been used to study the quantitative distribution of sucrase, maltase, isomaltase, trehalase, lactase (also in a patient with hypolactasia), leucyl naphthylamidase, alkaline and acid phosphatase, acid and hetero β-galactosidase, β-glucuronidase and thymidine kinase, along the villi and crypts of the human small intestine. The distribution patterns show how different enzymic properties appear and change quantitatively with age and stage of differentiation of the epithelial cells. Digestive enzymes occur almost exclusively along the villi with highest activities in the mid-villi or apical halves of the villi. Interesting differences in distribution patterns are seen within the villi. Acid phosphatase and acid β-galactosidase have a similar rather flat distribution from the crypts and to the tips of the villi, however, the activity of β-glucuronidase is decreased somewhat along the villi compared with the activity in the crypts. Lysosomal enzyme activities therefore are not confined to a special differentiative phase or age of the epithelial cells.

0199 GLUCAGON-INDUCED INCREASE OF ENTEROKINASE ACTIVITY IN HUMAN DUODENAL MUCOSA. *(E.)*

Rutgeerts, L.; Tytgat, G.; Eggermont, E. (Dept. Pediatr., Univ. Louvain, Belgium). *Digestion* 8(5):389-395, 1973.

Enterokinase, alkaline phosphatase, and sucrase were measured in duodenal mucosa of 5 normal volunteers, 1 patient with complete extrahepatic biliary and pancreatic duct obstruction, and 1 patient with active celiac disease before and after i.v. injection of glucagon (1 mg). A significant net increase in mucosal enterokinase, but not in alkaline phosphatase or sucrase, was observed during the 15-min period following the injection of glucagon. Following i.v. administration of alanine (100 mg/kg), a known stimulator of the endogenous secretion of glucagon, a similar rise in mucosal enterokinase was observed.

0200 LACTASE-PHLORIZIN HYDROLASE COMPLEX FROM MONKEY SMALL INTESTINE: STIMULATION OF HLORIZIN HYDROLASE ACTIVITY BY ORGANIC ACIDS. *(E.)*

amaswamy, S.; Radhakrishnan, A. N. (Christian ed. Coll. Hosp., Tamil Nadu, India). *Biochem. iophys. Res. Comm.* 54(1):197-204, 1973.

purified lactase-phlorizin hydrolase complex from onkey small intestine showed a new phlorizin hydroase activity at pH 3.3 in the presence of certain organic acids in addition to the normal activity at optimum pH 5.4. The highest stimulation (10- to 15-fold) was obtained with 20 mM tartaric acid followed by 10 mM fumaric, citric, *cis*-aconitic, *iso*-citric, and ascorbic acids. Higher concentrations of citric acid inhibited lactase activity at pH 3.3 but not at pH 5.4. Tartaric acid-stimulated phlorizin hydrolase activity was inhibited by a number of organic acids that had no effect on the unstimulated enzyme (α-oxoglutaric, succinic, malic, malonic, formic, glutamic, and aspartic acids). Pyruvic acid inhibited both stimulated and unstimulated activity. Sulfate and chloride ions were potent inhibitors of tartaric acid-stimulated enzyme activity.

0201 GOBLET CELL MUCIN OF RAT SMALL INTESTINE. CHEMICAL AND PHYSICAL CHARACTERIZATION.

(E.) Forstner, J. F.; Jabbal, I.; Forstner, G. G. (Toronto Western Hosp., Canada). *Can. J. Biochem.* 51(8):1154-1166, 1973.

Rat intestinal goblet cell mucin was characterized by chemical and physical methods. It is a flexible negatively charged macromolecule with molecular weight of 2.0 X 10^6, intrinsic viscosity of 15.3 dl/g, and axial ratio of 225:1. Its composition is protein 12%, total hexose 23%, hexosamine 22.4%, sialic acid 10%, fucose 6.6%, and sulfate <1% of the dry weight. It contains approximately 34 disulfide bonds/molecule. Like most mucin glycoproteins it was rich in serine, threonine, and proline (45.5 mol%) and poor in hydrophobic and sulfur containing amino acids. Acrylamide disc gel electrophoresis and analytic ultracentrifugation identified 1 major and 2 minor components. The components represented different molecular weight species of goblet cell mucin. No evidence of subunit structure was obtained by a variety of techniques, including the disruption of ionic, hydrophobic, and disulfide bonds by detergents, denaturants, or reducing agents.

0202 STUDIES ON THE QUANTITATION OF IMMUNOGLOBULIN IN HUMAN INTESTINAL SECRETIONS.

(E.) Samson, R. R.; McClelland, Shearman, D. J. C. (Univ. Dept. Therapeutics, Edinburgh, Scotland). *Gut* 14(8):616-626, 1973.

Studies on immunoglobulin measurement in intestinal secretion by the radial immunodiffusion method were made which show the effects of proteolytic digestion, IgA molecular size, and sampling and storage conditions on experimental results. Because of the presence of monomeric IgA in addition to secretory IgA, there is no satisfactory standard for IgA in gastrointestinal secretions, and only semi-quantitative results can be given. With radial immunodiffusion, IgG and IgM when subjected to tryptic digestion, and IgA when subjected to peptic digestion, may be overestimated because of the presence of fragments of immunoglobulins. In addition, pepsin rapidly destroys IgM and IgG. Both IgM and IgG are unstable in storage. The findings suggest that immunoglobulin concentration measurements in small intestinal aspirates should be interpreted with caution. These problems are also relevant to the detection of specific antibodies in gastrointestinal secretions.

0203 THE EFFECTS OF OXYGEN ON INTESTINAL CRYPT SURVIVAL IN COBALT-60-IRRADIATED MICE.

(E.) Sigdestad, C. P.; Hagemann, R. F.; Scott, R. M. (Sch. Med., Univ. Louisville, Ky.). *Radiat. Res.* 54(1):102-109, 1973.

Intestinal crypt survival was studied in male Ha/ICR mice exposed to gamma radiation in air, 100% normobaric oxygen, 100% hyperbaric oxygen (30 psi), and 6% normobaric oxygen. Exposures ranged from 900-2000 R at 47 R/min. There was no significant difference in the D_o for air, 100% oxygen, or oxygen at 30 psi. All fell between 377 and 380 R. Mice irradiated in 6% oxygen had a D_o of 529 R. The DMF (ratio of D_o in 6% oxygen to D_o in oxygen) was 1.4. The lack of difference in air and oxygen suggests that the highly vascularized (oxygenated) gut is maximally sensitive. At 3 days total cellularity increased after lower exposure to 120-150% of control levels and fell to less than control levels at doses greater than 1000 R. Hypoxia reduced the sensitivity, which required 1400 R to reduce cellularity to control levels. The compensatory response in crypt cellularity was greater, reaching values of 300% of control levels. These values also fell to near control levels with higher exposures. Crypt cellularity remained high (200%) in hypoxic mice for all doses tested. It peaked at 1700 R and reached 170% of control at 7kR. $LD_{50(5)}$ were 1413 R (air), 1356 R (oxygen), 1382 R (30 psi oxygen), and 2241 R (6% O_2). Corresponding levels of crypt survival were 13-38 in all cases.

0204 REGULATION OF TRIGLYCERIDE BIOSYNTHESIS IN ADIPOSE AND INTESTINAL TISSUE.

(E.) Polheim, D.; David, J. S. K.; Schultz, F. M.; Wylie, M. B.; Johnston, J. M. (Univ. Texas Southwestern Med. Sch., Dallas). *J. Lipid Res.* 14(4):415-421, 1973.

The synthesis of phosphatidic acid and di- and triglycerides *via* the glycerol-3-phosphate pathway is markedly inhibited by 2-monooleyl ether in microsomal and whole cell preparations obtained from adipose and intestinal tissue of golden hamsters. Monoglycerides are also inhibitors under conditions in which their hydrolysis is minimized. A correlation between inhibition by, and hydrolysis of, monoglycerides has been demonstrated. 2-Monooleyl ether is the most effective inhibitor of the several mono- and di-ethers and esters studied. The specificity of the inhibition of glycerol-3-phosphate acylation by 2-monoethers or 2-monoesters has been demonstrated because microsomal reduced nicotinamide adenine dinucleotide- and reduced nicotinamide adenine dinucleotide phosphate-cytochrome *c* reductase activities were not significantly inhibited. In intestinal mucosa the monoglyceride pathway is the major one for triglyceride biosynthesis. Added monoglycerides serve not only as additional substrate for the biosynthesis, but also inhibit synthesis *via* the glycerol-3-phosphate sequence. When intracellular monoglycerides are scarce, the synthesis shifts to the glycerol-3-phosphate route due to lessened inhibition. Thus these studies indicate that biosynthesis of triglycerides proceedes via the most efficient mechanism based on availability of substrate.

0205 RELEASE OF SEROTONIN FROM THE SMALL INTESTINE FOLLOWING HYPOTENSION IN THE CAT.

(E.) Fara, J.; Haglund, U. (Hlth. Sci. Ctr., State Univ. New York, Stony Brook). *Eur. Surg. Res.* 5(2):152-161, 1973.

Systemic hypotension was created in 14 cats by bleeding 20 to 35% of their blood from the femoral artery cannula. Local intestinal hypotension was created by placing an adjustable clamp around the superior mesenteric artery and adjusting the arterial inflow pressure to the intestine to 25-30 mm Hg for 2.5 to 3 hr, during continuous splanchnic nerve stimulation. To detect the presence of vasoactive substances, blood plasma from the animals was tested by isolated cat vascular smooth muscle, rat uterus bioassay, or direct biochemical determination of serotonin levels. The vascular smooth muscle assay revealed vasoactive properties of the plasma and pharmacological blocking studies indicated that this vasoactivity was due mainly to the presence of serotonin. This was confirmed in rat uterus bioassays and in biochemical assays in which similar high serotonin levels were demonstrated whether local intestinal or systemic hypotension had been induced, suggesting that serotonin is mainly released from the intestine. It is suggested that this intestinal serotonin release may be related to the general cardiovascular derangement seen after intestinal hypotension and hemorrhagic shock.

0206 THE ACTION OF DIBUTYRYL CYCLIC GMP (N^2-2'-O-DIBUTYRYL CYCLIC GUANOSINE-3', 5'-MONOPHOSPHATE) ON THE ILEUM OF GUINEA PIG.

(E.) Takayanagi, I.; Takagi, K. (Fac. Pharm. Sci., Univ. Tokyo, Japan). *Jap. J. Pharmacol.* 23(4):573-575, 1973.

Part of the ileum from male guinea pigs was placed in a modified Locke-Ringer solution and tested for its response to drugs. Dibutyryl cyclic guanosine-3', 5'-monophosphate (GMP) caused the ileum to contract in a dose-related manner. Tetrodotoxin (3 x 10^{-7} g/ml) and atropine (10^{-6} g/ml) did not inhibit the contractions caused by dibutyryl cyclic GMP (10^{-4} g/ml) in 8 of 10 experiments performed at this concentration. Atropine (10^{-6} g/ml) abolished the contractions caused by nicotine and acetylcholine. Tetrodotoxin (3 x 10^{-7} g/ml) abolished contractions due to nicotine. When the membrane was depolarized, acetylcholine and barium chloride effects were greatly reduced, whereas dibutyryl cyclic GMP (5 x 10^{-5} g/ml) contracted the ileum which it had been unable to do at this concentration in the normal solution. It is suggested that dibutyryl cyclic GMP acted in these experiments by not liberating chemical transmitters, particulary acetylcholine. The action of the drug was stronger in the depolarized muscle due to increased entry of the drug into cells by depolarization of cell membranes. Calcium ions supplied to the contractile elements may be part of the mechanism of this drug effect.

0207 CRITERION FOR ACTIVE FLUID SECRETION IN VIVO. *(E.)* Lifson, N. (Dept. Physiol., Univ. Minnesota, Minneapolis). *Nature [New Biol.]* 246(155):236-237, 1973.

0208 DIETARY ENHANCEMENT OF INTESTINAL CARCINOGENESIS BY DIMETHYLHYDRAZINE IN RATS. *(E.)* Rogers, A. E.; Newberne, P. M. (Dept. Nutr., Massachusetts Inst. Technology, Cambridge). *Nature* 246(5434/5):491-492, 1973.

0209 MICROPIPET COLLECTION OF SUCCUS ENTERICUS AT CRYPT OSTIA OF GUINEA PIG JEJUNUM. *(E.)* Nasset, E. S.; Ju, J. S. (Child. Hosp. Med. Ctr., Oakland, Calif.). *Digestion* 9(3):205-211, 1973.

0210 EFFECT OF MASSIVE PROXIMAL SMALL BOWEL ON INTESTINAL SUCRASE AND LACTASE ACTIVITY IN THE RAT. *(E.)* Bochenek, W. J.; Narczewska, B.; Grzebieluch, M. (Inst. Internal Med., Wroclaw, Poland). *Digestion* 9(3):224-230, 1973.

0211 INTESTINAL METABOLISM IN THIAMINE DEFICIENCY. *(E.)* Henderson, G. I.; McCandless, D. W.; Schenker, S. (Vanderbilt Univ. Sch. Med., Nashville, Tenn.). *Proc. Soc. Exp. Biol. Med.* 144(2):596- 02, 1973.

0212 EFFECT OF AGE AND ISOLATION ON THE INTESTINAL FLORA OF MICE. *(E.)* Pesti, L.; Gordon, H. A. (Univ. Kentucky Coll. Med., Lexington). *erontologia* 19(3):153-161, 1973.

213 INTESTINAL DIAMINE OXIDASE: ISOLATION, SUBSTRATE SPECIFICITY AND PATHOPHYSIO- OGICAL SIGNIFICANCE. *(E.)* Kusche, J.; Richter, .; Schmidt, J.; Hesterberg, R.; Specht, Ch.; orenz, W. (Dept. Surg., Univ. Marburg, Germany). *gents Actions* 3(3):182-183, 1973.

214 SCANNING ELECTRON MICROSCOPY OF THE DUODENAL MUCOSA OF LAMBS INFECTED WITH TRI- HOSTRONGYLUS COLUBRIFORMIS. *(E.)* Barker, I. K. Vet. Clin. Ctr., Univ. Melbourne, Australia). *rasitology* 67(Pt.3):307-314, 1973.

215 IMMUNOPATHOLOGY OF THE INTESTINE. *(Fl.)* Elewaut, A.; Barbier, F. (Univ. Hosp., ent, Belgium). *Tidschrift. Gastroenterol.* 15(6): 18-420, 1972.

0216 GASTRIN ACTIVITY IN THE CHICKEN PROVENTRICULUS. *(E.)* Olowo-Okorun, M. O.; Amure, B. O. (Dept. Physiol., Univ. Ibadan, Nigeria). *Nature* 246(5433):424-425, 1973.

0217 FERROUS IRON OXIDATION BY INTESTINAL MUCOSA: POSSIBLE ROLE IN MUCOSAL IRON METABOLISM. *(E.)* Manis, J. (Mt. Sinai Sch. Med., City Univ. New York, N.Y.). *Proc. Soc. Exp. Biol. Med.* 144(3):1025-1029, 1973.

0218 ON THE STATE OF LIPIDS IN THE RAT SMALL INTESTINE AFTER A FATTY MEAL. *(E.)* Lairon, D.; Lafont, H.; Domingo, N.; Nalbone, G.; Hauton, J. (Res. Pathol. Digest., Marseille, France). *Biochimie* 55(9):1165-1166, 1973.

0219 COMPARATIVE EFFECTS OF CHLORPROMAZINE, METHYLPREDNISOLONE, AND ALLOPURINOL DURING SMALL BOWEL PRESERVATION. *(E.)* Toledo-Pereyra, L. H.; Simmons, R. L.; Najarian, J. S. (Univ. Minnesota Hosp., Minneapolis). *Am. J. Surg.* 126(4):631-634, 1973.

0220 BLOOD GROUP ANTIGENICITY OF PURIFIED HUMAN INTESTINAL DISACCHARIDASES. *(E.)* Kelly, J. J.; Alpers, D. H. (Washington Univ. Sch. Med., St. Louis, Mo.). *J. Biol. Chem.* 248(23):8216-8221, 1973.

0221 EFFECT OF SODIUM TAURODEOXYCHOLATE ON BIOLOGICAL MEMBRANES: RELEASE OF PHOSPHORUS, PHOSPHOLIPID AND PROTEIN FROM EVERTED RAT SMALL INTESTINE. *(E.)* Feldman, S.; Reinhard, M.; Willson, C. (Sch. Pharm., Temple Univ., Philadelphia, Pa.). *J. Pharm. Sci.* 62(12):1961-1964, 1973.

0222 AZO REDUCTION OF SALICYL-AZO-SULPHAPYRIDINE IN GERM-FREE AND CONVENTIONAL RATS. *(E.)* Schroder, H.; Gustafsson, B. E. (Dept. Zoophysiol., Univ. Uppsala, Sweden). *Xenobiotica* 3(4):225-231, 1973.

0223 AFFINITY CHROMATOGRAPHY OF HEPATITIS B ANTIGEN ON CONCANAVALIN A LINKED TO SEPHAROSE. *(E.)* Neurath, A. R.; Prince, A. M.; Lippin, A. (New York Blood Ctr., New York). *J. Gen. Virol.* 19(3):391-395, 1973.

See also, 0005, 0006, 0038, 0041, 0066, 0138, 0147, 0389, 0502, 0669.

GENERAL

24 SEPARATION OF HUMAN SMALL-INTESTINAL SUCRASE FROM ISOMALTASE. *(E.)* Asp, N. G.; hlqvist, A. (Dept. Nutr., Univ. Lund, Sweden). *BS Lett.* 35(2):303-305, 1973.

A mucosal homogenate was prepared from human proximal jejunum. After ultracentrifugation, the supernatant contained about 10% of the disaccharidase activities. Chromatography on Bio-Gel P-300 gave a major peak, the sucrase-isomaltase complex, containing about 80% of the sucrase and isomaltase activities. The other 20% was eluted in a second peak, displaying considerably lower molecular weight. It was possible to separate the second peak into free sucrase and free isomaltase peaks. Both peaks had maltase activity, and the isomaltase peak also had glucoamylase activity. Free glucose appeared in the range of the isomaltase peak. Thus, solubilization with papain released not only sucrase-isomaltase complex as previously shown, but also some free sucrase and isomaltase from the membrane fragments of human small-intestinal homogenate. It is suggested that the enzyme peak referred to in the literature as sucrase-1 is probably free sucrase.

0225 PROSTAGLANDIN E_1: ITS EFFECTS ON HEPATIC CIRCULATION IN DOGS.

(E.) Geumei, A.; Bashour, F. A.; Swamy, B. V.; Nafrawi, A. G. (Cardiopulmonary Inst. Methodist Hosp., Dallas, Texas). *Pharmacology* 9(6):336-347, 1973.

The effects of i.v., intra-arterial, and intraportal injection of prostaglandin E_1 (PGE_1) on hepatic artery and portal vein flows were studied in anesthetized dogs. I.v. administration of PGE_1 (1 μg/kg) produced an increase in hepatic artery flow, portal vein flow, and portal vein pressure concomitant with a significant decrease in systemic arterial pressure. Injection of the same dose of PGE_1 into the portal vein caused essentially no change in portal vein flow and pressure, or systemic arterial pressure. Intra-arterial injection of PGE_1 increased hepatic artery flow and decreased its resistance, with no change in systemic arterial pressure. The hepatic arterial effect of PGE_1 was dose-dependent and was not abolished after β-adrenoceptor blockade by propranolol (1 mg/kg, i.v.). It is concluded that PGE_1 directly dilates hepatic arteries and indirectly influences the portal venous circulation.

0226 MUCOSAL LESIONS IN THE SMALL INTESTINE OF THE CAT DURING LOW FLOW.

(E.) Ahren, C.; Haglund, U. (Dept. Physiol., Univ. Goteborg, Sweden). *Acta. Physiol. Scand.* 88(4):541-550, 1973.

Examination was made of the mucosal changes produced at the villous tips of the cat small intestine during a mimicked shock situation (regional hypotension at 30 mm Hg during nervous vasoconstrictor fibre activation). Macroscopically, after a 2 hr hypotensive period, petechial bleedings and ulcerations were regularly seen in the mucosa. Microscopic findings showed epithelial lifting of various degrees at the tips of the villi and in some cases a complete denudation of the villous tips. Intraluminal perfusion of a segment with oxygenated saline during the hypotension prevented or greatly reduced the mucosal lesions compared with control segments. However, intraluminal perfusion with nitrogenated saline did not change the mucosal lesions as compared with control. This strongly indicates that hypoxia *per se* is important in the pathogenesis of the mucosal lesions, while the intestinal content (e.g., energy substrates or enzymes) is not. It is suggested that the hypoxia is due to an extravascular shunting of oxygen in the intestinal countercurrent exchanger.

0227 MUCOSAL HEMODYNAMICS IN THE SMALL INTESTINE OF THE CAT DURING REDUCED PERFUSION PRESSURE.

(E.) Lundgren, O.; Svanvik, J. (Dept. Physiol., Univ. Goteborg, Sweden). *Acta Physiol. Scand.* 88(4):551-563, 1973.

An indicator-dilution technique was used to study the effects of reduced arterial inflow pressure and increased venous outflow pressure on mucosal and villous intravascular flows and volumes in the cat small intestine. When reducing arterial inflow pressure from about 100 to about 30 mm Hg, villous plasma volume and mean transit time increased, while villous plasma flow was largely unchanged. Concomitantly, total intestinal blood flow decreased significantly, indicating that a larger fraction of total plasma flow was diverted to the villi at low inflow pressure. Villous hemodynamics was largely unaffected when intestinal blood flow was reduced by increasing venous outflow pressure. Mucosal red cell and plasma flows were affected in the direction of and, often in proportion to, total intestinal blood flow. These results suggest that the autoregulatory capacity of the villous vessels is larger than that of vessels in deeper parts of the mucosa. Therefore, during a reduction in arterial pressure, blood flow is increasingly redistributed from deeper parts of the mucosa to the villous circulation.

0228 RELATIONSHIP OF HQ-275 TO BILIARY EXCRETION AND PORTAL BLOOD FLOW IN DOGS.

(E.) Ochiai, T.; Nagao, T.; Murata, S.; Yoshimoto, K.; Kowa, Y. (Biol. Res. Labs., Tanabe Seiyaku Co., Osaka, Japan). *Jap. J. Pharmacol.* 23(4):575-578, 1973.

A tracheal cannula was inserted in 8 fasted adult mongrel dogs. Tubes were centrally inserted into the common bile duct and through the papilla into the main pancreatic duct. The gallbladder was resected and the accessory pancreatic duct was also ligated and cut. After the biliary and pancreatic juice outflow had reached a steady state, 1-morpholinoacetyl-2-methyl-3-phenyl-4-oxo-1,2,3,4-tetrahydro quinazoline hydrochloride (HQ-275, 3 or 10 mg/kg, i.v.) was administered. Biliary outflow was maximum for the first 30 min. The drug was noted in the biliary excretion in animals where the gallbladder had been resected as well as in rats which had undergone a cholecystostomy. Thus, cholekinetic action did not affect the biliary excretion of the HQ-275. The portion of solid contents/biliary volume excreted after the drug was administered was lower in concentration than cholaneretic agents, indicating that the effect of HQ-275 depends on the hydrocholeretic action which mainly increases the portion of water in biliary excretion. No influence was observed on pancreatic-juice excretion. The drug markedly and dose-dependently increased portal blood flow, a 1 mg/kg dose causing a slight increase in flow and a 30 mg/kg dose resulting in an 86% increase immediately after injection. Femoral artery blood pressure was not changed by a 1 mg/kg dose but fell transiently by 10 mmHg immediately after a 10 mg/kg dose was given. Pulse was slightly increased by HQ-275.

0229 THE ADRENERGIC CONTROL OF LOWER ESOPHAGEAL SPHINCTER FUNCTION. AN EXPERIMENTAL MODEL OF DENERVATION SUPERSENSITIVITY. *(E.)* DiMarino, A. J.; Cohen, S. (Univ. Pennsylvania Hosp., Philadelphia). *J. Clin. Invest.* 52(9):2264-2271, 1973.

To evaluate the adrenergic regulation of lower esophageal sphincter (LES) function, LES pressure, LES relaxation during swallowing, and blood pressure were measured in the anesthetized opossum *Didelphis virginiana* during i.v. administration of alpha and beta adrenergic agonists and antagonists. Studies were done in controls and animals adrenergically denervated with 6-hydroxydopamine. Alpha adrenergic agonists (norepinephrine, phenylephrine) increased LES pressure and blood pressure, while a beta adrenergic agonist (isoproterenol) decreased both pressures. Alpha adrenergic antagonism (phentolamine) reduced basal LES pressure by 38.3%. Beta adrenergic antagonism (propranolol) had no significant effect on either basal LES pressure or percent of LES relaxation with swallowing. After adrenergic denervation with 6-hydroxydopamine, basal LES pressure was reduced by 22.5% but LES relaxation during swallowing was unaltered. In denervated animals, both LES pressure and blood pressure dose-response curves showed characteristics of denervation supersensitivity to alpha but not to beta adrenergic agonists. These studies suggest: that a significant portion of basal LES pressure is dependent on alpha adrenergic stimulation; that LES relaxation during swallowing is not an adrenergically mediated response; and that LES pressure response to alpha adrenergic agonists after 6-hydroxydopamine may serve as a model of denervation supersensitivity in the gastrointestinal tract.

0230 HEMODYNAMIC EFFECTS OF DISTENSION OF THE DOG SMALL INTESTINE. *(E.)* Hanson, K. M. Ohio State Univ. Coll. Med., Columbus). *Am. J. hysiol.* 225(2):456-460. 1973.

tepwise inflation and deflation on lumen pressure nd hemodynamics were studied in 29 isolated auto- erfused segments of dog ileum. An electromagnetic lood flowmeter was used to measure arterial inflow. ntraluminal pressure was measured with a catheter ip pressure transducer. Periods of spontaneous hythmic motor activity were recorded consisting of scillations with an amplitude of about 50 mm Hg. hey had no significant effect on mean vascular esistance and neither impeded nor enhanced mesen- eric blood flow. On ileum distension, the nitial decrease in flow and increase in resistance howed a certain degree of recovery over a period f several min, resulting from attenuation of ini- ial increase in gut lumen pressure. This was at- ributed to stress relaxation of the ileal wall. n active autoregulatory response to the initial decrease in vessel transmural pressure may account for part of the flow recovery. In 13 experiments observations were repeated during intra-arterial infusion of papaverine. There was greater relative decrease in flow and increase in resistance at any given gut lumen pressure in papverinized ileum, probably due to loss of the active autoregulatory component.

0231 MECHANISM OF HYPERALIMENTATION IN THE SUPPRESSION OF UPPER GASTROINTESTINAL SECRETIONS. *(E.)* Towne, J. B.; Hamilton, R. F.; Stephenson, Jr., D. V. (Univ. Nebraska Hosp., Omaha). *Am. J. Surg.* 126(6):714-716, 1973.

The effects of the various components of parenteral hyperalimentation on upper gastrointestinal secretions were studied. Thomas duodenal cannulas were inserted opposite the main pancreatic duct and a Maydl feeding jejunostomy was constructed in each of 5 dogs. The accessory pancreatic duct was ligated and a gastric cannula was placed. The administration of 20% dextrose increased the blood sugar levels from 86 to 720 mg/100 ml. When 20% dextrose plus 5% amino acids were infused, duodenal volume decreased 50.5%, bicarbonate concentration increased 18.7%, bilirubin output decreased 86.2%, amylase output decreased 70.8% and the protein output decreased 73.1%. When 20% dextrose was infused alone, duodenal volume decreased 29.4%, bicarbonate increased 12%, bilirubin output decreased 83.5%, amylase output decreased 39.1% and protein output decreased 86.8%. When 5% amino acids were infused alone, duodenal volume decreased 10.1%, bicarbonate concentration increased 4.6%, bilirubin output decreased 65.4%, amylase output decreased 16.7%, and protein output decreased 63.2%. Suppression of protein secretion after amino acid infusion demonstrated the suppression of proximal small intestinal enzymatic production by the infusion. It is suggested that the elevated blood glucose level stimulated hypothalamic centers, causing reflex suppression of upper gastrointestinal secretions. Similarly, an increase in endogenous insulin secretion resulting from glucose and amino acid infusion could produce this inhibitory effect on proximal small intestinal secretions.

0232 DISAPPEARANCE OF GASTRIN ACROSS THE LUNG. *(E.)* Korman, M. G.; Hansky, J.; Ritchie, B. C.; Watts, J. M.; Maloney, J. E. (Monash Univ., Dept. Med., Melbourne, Australia). *Aust. J. Exp. Biol. Med. Sci.* 51(5):679-687, 1973.

The fate of injected synthetic human gastrin was studied in intact dogs, sheep, and pigs as well as in isolated perfused liver and lungs using radioimmunoassay. The half-life of synthetic human gastrin was similar in all intact animals at approximately 7 min. Acute bilateral nephrectomy and total enterectomy did not alter this half-life. Gastrin did not disappear after passage across the isolated perfused pig liver. However, the disappearance rate for synthetic human gastrin across the isolated perfused lungs of the dog or sheep was identical to that in the intact animal. Studies in the dog undergoing cardiopulmonary bypass indicated that the half-life of synthetic human gastrin was prolonged to 35 min. These studies suggest that the lungs are important in the disappearance of gastrin from the circulation, and that the liver, kidney, and small bowel do not function significantly in this capacity. The high incidence of peptic ulceration in patients with chronic respiratory disease suggests that failure of the lungs to carry out gastrin breakdown may be important in the etiology of this peptic ulceration.

0233 THE EFFECT OF HEMORRHAGE ON HEPATOSPLANCHNIC HEMODYNAMICS, LIVER FUNCTION AND HEPATIC METABOLISM. *(E.)* Krarup, N. (Inst. Physiol., Univ. Aarhus, Denmark). *Acta Physiol. Scand.* 89(2):269-277, 1973.

Following a control period, cats in the postabsorptive state and anesthetized with chloralose were bled 15 ml/kg, approximately 25% of the blood volume. Due to a large decrease in portal flow, the total liver blood flow decreased in parallel to the mean arterial blood pressure, whereas the hepatic arterial flow remained constant. Thus the splanchnic vascular resistance was unchanged, the hepatic arterial resistance decreased, and the gastrointestinal resistance increased after the hemorrhage. The portal venous resistance was also significantly increased. The hemorrhage resulted in hepatic glycogenolysis and peripheral glycolysis, but neither the splanchnic elimination of ethanol, consumption of oxygen, nor hepatic dye elimination was decreased, and the hepatic redox level remained unaltered. The results indicate that, although hemorrhage is accompanied by marked changes in hepatosplanchnic hemodynamics, the intrahepatic distribution of blood flow is not subject to gross alteration. These results do not support transillumination studies in which hemorrhage caused redistribution of the hepatic blood flow, resulting in a decreased number of perfused sinusoids or excessive decrease in the flow through some of the sinusoids. It is suggested that this discrepancy may result from a difference in the degree of bleeding in the two studies.

0234 THE RELATIONSHIP BETWEEN THE HOST AND ITS INTESTINAL MICROFLORA. *(E.)* Schaedler, R. W. (Thomas Jefferson Univ. Med. Coll., Philadelphia, Pa.). *Proc. Nutr. Soc.* 32(2):41-47, 1973.

0235 STUDIES ON THE NATURE OF PLASMIDS ARISING FROM CONJUGATION IN THE HUMAN GASTROINTESTINAL TRACT. *(E.)* Anderson, J. D.; Ingram, L. C.; Richmond, M. H.; Wiedemann, B. (Dept. Bacteriol., Univ. Bristol, England). *J. Med. Microbiol.* 6(4):475-486, 1973.

0236 DETECTION OF HEAT-LABILE ESCHERICHIA COLI ENTEROTOXIN WITH THE USE OF ADRENAL CELLS IN TISSUE CULTURE. *(E.)* Donta, S. T.; Moon, H. W.; Whipp, S. C. (Univ. Iowa Hosp. Dept. Med., Iowa City). *Science* 183(4122):334-336, 1974.

0237 THE ISOMERISATION OF BILIRUBIN MONOGLUCURONIDE. *(E.)* Jansen, P. L. M. (Fac. Med., Inst. Pharmacol., Nijmegen, Netherlands). *Clin. Chim. Acta* 49(2):233-240, 1973.

0238 GASTRIN AND GASTRIC MUCOSAL BLOOD FLOW IN THE RAT. *(Fr.)* Ozturkcan, O.; Derache, R. (Inst. Physiol., Toulouse, France). *Biol. Gastroenterol. (Paris)* 6(Supp. 2):151-156, 1973.

0239 SURVIVAL PREDICTION BASED ON CONTINOUS MONITORING OF HEPATIC PO_2 AND BLOOD FLOW IN LIVER ISCHEMIA. *(E.)* Vilinskas, J.; Ranganathan, V.; Roberts, M. P.; Owens, G.; Maenza, R. (Univ. Connecticut Hlth. Ctr., Hartford). *J. Abdominal Surg.* 15(10):193-195, 1973.

0240 SEQUENCE OF CHANGES IN BIOCHEMICAL PARAMETERS IN EXPERIMENTAL CALORIE-PROTEIN MALNUTRITION IN THE RAT. *(Pol.)* Mareckova, O.; Skala, I.; Pechar, J.; Marecek, Z.; Vulterinova, M. (Inst. Clin. Exp. Med., Prague, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 27(5):285-289, 1973.

0241 VASCULAR COMPLICATIONS FOLLOWING NEEDLE PUNCTURE OF THE LIVER. AN ANGIOGRAPHIC INVESTIGATION IN THE RABBIT. *(E.)* Hellekant, Ch.; Olin, T. (Univ. Hosp., Lund, Sweden). *Acta Radiol.* [*Diagn.*] *(Stockh.)* 14(5):577-582, 1973.

0242 HAEMOSTATIC STUDIES FOLLOWING EXTENSIVE LIVER RESECTION IN DOGS. *(E.)* Ro, J. S.; Flatmark, A. (Inst. Thrombosis Res., Oslo, Norway). *Scand. J. Gastroenterol.* 8(7):615-620, 1973.

0243 AMINO-ACID SEQUENCE OF PORCINE PEPSIN. (PROTEIN/CYANOGEN BROMIDE/ACTIVE SITE). *(E.)* Tang, J.; Sepulveda, P.; Marciniszyn, J.; Chen, K. C. S.; Huang, W.; Tao, N.; Liu, D.; Lanier, J. P. (Univ. Oklahoma Sch. Med., Oklahoma City). *Proc. Natl. Acad. Sci. U.S.A.* 70(12):3437-3439, 1973.

0244 ACUTE TOXICITY OF A HOMOLOGOUS SERIES OF BRANCHED-CHAIN PRIMARY ALCOHOLS. *(E.)* Scala, R. A.; Burtis, E. G. (Med. Res. Div., Esso Res. Engineering Co., Linden, N.J.). *Am. Ind. Hyg. Assoc. J.* 34:493-499, 1973.

0245 AN ASSESSMENT OF THE PHYSIOLOGICAL IMPORTANCE OF THE LARGE HEPATIC VENOUS SLUICES IN THE DOG. *(E.)* Andrews, W. H. H.; Ritchie, H. D.; Maegraith, B. G. (London Hosp., England). *Q. J. Exp. Physiol.* 58(4):325-333, 1973.

0246 EFFECT OF EXTENSIVE EXPERIMENTAL RESECTION OF THE SMALL INTESTINE ON SERUM LEVELS OF SOME ELECTROLYTES AND ALKALINE RESERVE. *(Pol.)* Mrozowski, D.; Parszewski, M.; Semanycz, J. (Pomeranian Acad. Med., Szczecin, Poland). *Patol. Pol.* 23(3):379-381, 1972.

See also, 0006, 0036.

DIAGNOSTIC PROCEDURES

0247 FECAL CHYMOTRYPSIN: A RELIABLE INDEX OF EXOCRINE PANCREATIC FUNCTION IN CHILDREN.
(E.) Bonin, A.; Roy, C. C.; Lasalle, R.; Weber, A.;
Morin, C. L. (Saint Justine Hosp., Montreal, Canada).
J. Pediatr. 83(4):594-600, 1973.

The 72-hr fecal output of chymotrypsin, expressed
as mg/kg, was measured in 64 children with pancrea-
tic disease (60 with cystic fibrosis, 3 with chronic
relapsing pancreatitis, and 1 with exocrine pancrea-
tic insufficiency and bone marrow dysfunction)
and in 57 children with various hepatic and intesti-
nal disorders. Fecal chymotrypsin output clearly
listinguished 57 cystic fibrosis patients with
steatorrhea from both the 35 control subjects and
7 children with cystic fibrosis without fat malab-
sorption. Three of the children with pancreatic
lisease other than cystic fibrosis did not have
si~nificant pancreatic insufficiency, but the fecal
hymotrypsin in this group differed significantly
from that of the controls. Values in hepatic dis-
rders, gluten-induced enteropathy, chronic diarrhea
rithout fat malabsorption, intractable diarrhea,
nd the short bowel syndrome did not differ from
ontrol values. The only value (1.3 mg) within
he range observed in pancreatic disorders was seen
n a case of intestinal scleroderma. Duodenal en-
yme concentrations in 35 children correlated well
ith fecal measurements in 5 cases of primary pan-
reatic disease with significant achylia.

248 DIAGNOSIS OF PANCREATIC EXOCRINE INSUFFICIENCY BY FECAL CHYMOTRYPSIN ACTIVITY.
.) Moeller, D. D.; Dunn, G. D.; Klotz, A. P.
Jniv. Kansas Med. Ctr., Kansas City, Mo.). *Am. J.*
g. Dis. 18(9):792-796, 1973.

ntrol subjects (13 males and 1 female aged 24-70
) and 9 male patients (aged 30-64 yr) with severe
ncreatic exocrine insufficiency were carefully
udied to establish normal values of fecal chymo-
ypsin activity. Diagnoses in the 9 patients in-
uded status after Whipple operation for carcinoma
ampulla of Vater (1), chronic calcific pancreati-
s (4), chronic pancreatitis; status after Billroth
(1), status after Whipple operation for carcinoma
head of the pancreas (1), calcific pancreatitis
), and chronic pancreatitis with cirrhosis (1).
agnoses in the control subjects included irritable
lon (8), chronic duodenal ulcer and Parkinson's
sease (1), chronic alcoholism (1), chronic diarrhea
th osteomalacia (1), acute gastritis (1),
pendicitis (1), and hiatal hernia (1). Mean
lues for fecal chymotrypsin were uniformly
normal in patients with pancreatic exocrine insuffi-
ency. This study supports previous work in
lidating this test as a simple but effective
thod of screening patients with steatorrhea for
diagnosis of pancreatic exocrine insufficiency.

9 DIAGNOSTIC YIELD OF FIBRE-OPTIC ENDOSCOPY IN THE OPERATED STOMACH. *(E.)* Cotton, P.
Rosenberg, M. T.; Axon, A. T. R.; Davis, M.;
rce, J. W.; Price, A. B.; Stevenson, G. W.;
dram, R. (St. Thomas Hosp., London, England).
J. Surg. 60(8):629-632, 1973.

Fiber-optic instruments were used on 212 occasions to examine 177 patients who were symptomatic after peptic ulcer surgery. The time lapsing from the original operation to endoscopy ranged from 2-42 yr after partial gastrectomy, 2 months to 12 yr after vagotomy and pyloroplasty, and 1-23 yr after gastroenterostomy. Diagnoses other than gastritis were reached in 83 patients and included 46 patients with ulcers. Five ulcers were not seen; in 4 cases this resulted from inadequate equipment early in the series. Radiology detected only 60% of the ulcers and raised many false-positive diagnoses. Many originally mistaken interpretations were corrected by expert review of the radiographs. Retained suture materials seen by endoscopy were removed using biopsy forceps. Gastric mucosal congestion and gastritis were common in the operated stomach, but the clinical significance of these changes remains obscure in the absence of a control series. Fiber-optic endoscopy is now an essential part of the investigation of patients who are symptomatic following ulcer surgery.

0250 AUSTRALIA ANTIGEN IN LIVER TISSUE. AN IMMUNOFLUORESCENT AND IMMUNOELECTRON MICROSCOPIC STUDY. *(E.)* Shikata, T. (Fac. Med., Univ. Tokyo, Japan). *Jap. J. Exp. Med.* 43(4):231-245, 1973.

An immunofluorescent as well as immunoelectron microscopic study of human liver tissue was made during the course of various liver diseases: fulminant hepatitis (4 cases), subacute hepatitis (1), chronic hepatitis (30), cirrhosis (2), and malignant hepatoma (8), in order to clarify the localization of Australia antigen (Au-antigen) in the tissue and cells. Au-antigen stained specifically by immunofluorescence was found only in the cytoplasm of hepatocytes and, to a lesser extent, in the mesenchymal cells; no obvious Au-antigen was identified in the hepatocyte nucleus. The distribution of hepatocytes containing fluorescent Au-antigen in liver tissue was very irregular, and showed 2 patterns. In one pattern almost all parenchymal cells in some areas, in the sublobular level, contained Au-antigen. In the other pattern, solitary parenchymal cells with Au-antigen were scattered sporadically in the liver cell plates. It is suggested that the former is an early stage of Au-antigen proliferation in some parts of liver tissue and the latter is a late stage. In the latter, scattered cells containing fluorescent Au-antigen were rounded and resembled acidophilic bodies. These degenerative hepatocytes contained many particles measuring about 200 Å in diameter. These particles and tubular structures were also present in the lysosomes of hepatocytes. No nuclear localization was established. In fulminant hepatitis, stainable Au-antigen was very scanty, even in a case with Au-antigenemia. On the other hand, immunoglobulin and complement were detected in the necrotic areas by immunofluorescence method, suggesting an immuno complex was involved in liver cell damage. In malignant hepatoma, stainable Au-antigen was not usually found in hepatoma cells, but it was present in noncancerous hepatocytes. The immunofluorescent method revealed that Au-antigen persisted for 4 weeks in organ cultures of human fetal liver which were inoculated with serum from an Au-antigen-positive patient with acute hepatitis.

0251 ANGIOGRAPHIC DIFFERENTIATION BETWEEN INFLAMMATORY DISEASE AND CARCINOMA OF THE PANCREAS. *(E.)* Tylen, U. (Univ. Hosp., Lund, Sweden). *Acta Radiol.* 14(3):257-272, 1973.

Differential diagnosis between pancreatitis and carcinoma of the pancreas were investigated angiographically in 19 patients (13 males and 6 females) in whom an incorrect diagnosis had been made. The diagnosis of carcinoma was particularly difficult in the presence of expansive lesions and calcifications; an incorrect positive diagnosis was often made when vascular changes were strictly localized. It is suggested that coning-down of the roentgen beam, compression, superselective catheterization, and pharmacological agents are possible means of improving the quality of the examination. Repeat angiography at short intervals is recommended in doubtful cases so that malignant changes can be detected while radical surgery is still possible. Technical quality and experience in pancreatic angiography are both extremely important since only the demonstration of tumor vessels, though scanty in this type of growth, permits a definite diagnosis of carcinoma of the pancreas.

0252 ACCURACY OF ANGIOGRAPHY IN THE DIAGNOSIS OF CARCINOMA OF THE PANCREAS. *(E.)* Tylen, U. (Univ. Hosp., Lund, Sweden). *Acta Radiol. Diag.* 14(1):449-466, 1973.

Angiographic findings in 116 patients with verified carcinoma of the pancreas were examined in retrospect. The growth involved the head of the pancreas in 87 cases, the body in 21, and the tail in 8. A correct preoperative diagnosis had been made in 79 and a retrospective diagnosis was possible in an additional 30 patients. An incorrect positive diagnosis was made in 18 patients preoperatively and in 5 patients retrospectively, a common cause being localized pancreatitis. Of the 18 incorrectly diagnosed cases, 5 had inflammatory pancreatic changes, another had biliary tract disease, and 1 had stenosis of the papilla of Vater. Variations in the vascular anatomy and a poor technique contributed to diagnostic errors. Although large carcinomas can be easily diagnosed by angiography, difficulties may arise when vascular changes are small and localized. Irregularities in the blood vessels are usually more pronounced when they are encased by pancreatic carcinoma than in pancreatitis.

0253 SELECTIVE ARTERIOGRAPHY IN THE DIAGNOSIS OF CHRONIC INFLAMMATORY PANCREATIC DISEASE. *(E.)* Khademi, M.; Lazaro, E. J.; Rickert, R. R. (Coll. Med. Dent. New Jersey, Newark). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 119(1):141-150, 1973.

Selective superior mesenteric and celiac angiography was performed on 78 patients suspected of having chronic pancreatitis. Positive angiographic findings were confirmed by surgical inspection, pathological examination, or clinical, laboratory, and conventional roentgenological studies in 59 of these 78 cases (75%). Angiography gave false-positive results in 10 cases, false-negative results in 2 cases, and equivocal results in 8 cases. Focal or generalized pancreatic blush, small arterial beading and irregularity were the most common findings. Hypervascularity and enlargement of the organ in acute recurrent or active stages and hypovascularity in advanced fibrosis were observed. Nonfunctioning splenic vein, seen in 14% of cases is the most reliable sign of chronic pancreatitis in absence of adjacent arterial encasement.

0254 PERITONEOSCOPY: ITS VALUE IN THE DIAGNOSIS OF LIVER DISEASE. *(E.)* Czaja, A. J.; Steinberg, A. S.; Saldana, M.; Marin, G. A. (Philadelphia Gen. Hosp., Pa.). *Gastrointest. Endosc.* 20(1):23-25, 1973.

Liver specimens from 36 consecutive cadavers were obtained using closed needle biopsy and guided biopsy performed under peritoneoscopy (34 of the 36 cases). Visual inspection of the liver at peritoneoscopy was diagnostic by itself in 16 cases (44.5%). Micronodular cirrhosis, metastatic tumor, and severe passive congestion were diagnosed by visualization alone. Tissue obtained by guided needle biopsy was diagnostic in 31 of the 36 cadavers (86.2%). Of the 34 specimens obtained by the guided technique, 31 were diagnostic (91.2%). Combining visual findings with the histology of the specimens obtained by guided biopsy gave a correct diagnosis in 97% of the 34 cases in which peritoneoscopy was performed. A correct diagnosis by blind needle biopsy specimens was made in 32 of the 36 cadavers. Cirrhosis, fatty liver, congestion, and inflammation were readily diagnosed by closed biopsy, but 4 of the 5 cases of metastatic liver disease were missed by this procedure.

0255 PROSPECTIVE UPPER GASTROINTESTINAL SERIES IN THE EVALUATION OF BURNED CHILDREN. *(E.)* Law, E. J.; MacMillan, B. G.; Gelfand, D. W.; Day, S. B. (Shriners Burns Inst., Cincinnati, Ohio). *Am. J. Surg.* 126(3):366-371, 1973.

Upper gastrointestinal series were used to detect possible ulcers in children up to 15 yr old. In 152 patients 214 studies were performed. Ulcers were demonstrated unequivocally in the stomach or duodenum in 3.4% of the patients, while suspected ulcers were present in another 8 cases, for a combined incidence of 7.4%. Most of these patients were asymptomatic. Superior mesenteric artery syndrome in some degree was revealed in 12 patients (5.9% of all cases). A significant number of burned patients therefore had radiographically detectable disease, and this awareness aided in clinical management. No complications resulted from the performance of these studies.

0256 THE FOLIC ACID URINARY EXCRETION TEST IN THE DIAGNOSIS OF INTESTINAL MALABSORPTION OF FOLIC ACID. *(E.)* Elsborg, L. (Dept. Med.

II., Arhus Univ., Denmark). *Danish Med. Bull.* 20(3):102-104, 1973.

Intestinal absorption of folic acid has been determined by assay of urinary excretion after an oral dose of ^{3}H-folic acid. To determine absorption i.m., an oral dose of 200 μg ^{3}H-folic acid combined with 15 mg non-labeled folic acid i.m. is suitable. This yielded urinary excretion of 30-54% in normal subjects. This test was also performed on 54 patients with malabsorption and normal folate status and on 18 patients with deranged folate status caused by postgastrectomy syndrome (5), celiac disease (3), idiopathic steatorrhea (3), and extensive resections of small intestines (2). The folic acid urinary excretion test did not show a significant difference for patients with malabsorption and a normal folate status, but decreased urinary excretion was found in patients with folate deficiency from intestinal malabsorption. These observations indicate a strong correlation between the degree of folic acid malabsorption and the urinary excretion test.

0257 RADIOLOGICAL AND ENDOSCOPIC STUDY OF THE ESOPHAGUS IN SCLERODERMA. *(Fr.)* Petite, J. P.; Soussaline, M.; Jodelet, P.; Chaput, J. C.; Guerre, J.; Housset, E. (Broussais Hosp., Paris, France). *Arch. Fr. Mal. App. Dig.* 62(2):105-112, 1973.

Clinical, radiological, and esophagoscopic examinations were performed on 33 patients (27 women and 6 men, aged 33-70 yr) with generalized scleroderma. Of these patients, 11 had dysphagia, 7 had manifestations of gastroesophageal reflux, and 5 had dysphagia associated with a reflux syndrome. No clinical symptoms of esophageal involvement were found in 20 patients. Radiological examinations demonstrated that 26 of these 33 patients had disturbances in esophageal motor activity. The most common endoscopic manifestations, found in these same 26 patients, were absence of peristaltic contractions in the lower part of the esophagus and the persistence of "water lakes" for at least 30 sec after administration of a few ml of water while the patient was lying down. Esophageal reflux was diagnosed in 17 patients, hiatus hernia in 6, peptic esophagitis in 10, and peptic stenosis in 4. It is recommended that all patients with generalized scleroderma undergo radiological and esophagoscopic examinations since many have no clinical symptoms of esophageal involvement.

0258 DETECTION OF IMMUNOGLOBULINS IN PARAFFIN-EMBEDDED LIVER BIOPSIES. STUDIES IN 100 ATIENTS WITH SPECIAL REGARD TO IMMUNOLOGICAL FIND-NGS IN ACTIVE CHRONIC HEPATITIS. *(E.)* Husby, G.; lomhoff, J. P.; Skrede, S.; Elgio, K.; Gjone, E. Rikshosp. Univ. Hosp., Oslo, Norway). *Scand. J. astroenterol.* 8(7):621-629, 1973.

araffin-embedded liver biopsies were examined by irect immunofluorescence for immunoglobulins and myloid in patients with established or suspected iver disease. In all 12 active chronic hepatitis atients serum IgG was increased, and smooth muscle antibodies were present. Of these 12, 4 had Australia antigen in serum. Immunoglobulins were present in the liver, mainly within mononuclear cells resembling plasma cells. More than 80% of the immunolobulins were IgG, about 15% were IgA, and less than 5% were IgM. In primary biliary cirrhosis, most of the 9 patients had increased serum IgM, and 80% had mitochondrial antibodies. In the liver, the immunological activity was low, but IgM-containcells were more frequent than in other types of liver disease. Also in alcoholic cirrhosis (9 patients) and cryptogenic cirrhosis (4 patients), the immunofluorescence was much less pronounced than in active chronic hepatitis. In the 6 acute hepatitis cases, there was a remarkably high amount of IgA in the liver tissue. A shift from IgA to IgG was seen when acute hepatitis progressed into chronic disease (8 cases). In 15 cases with normal histology, no immunoglobulin was detected in the liver tissue. In 7 patients with clinical and histological evidence of amyloidosis of the liver, varying amounts of fluorescent amyloid material were present. These results indicate that immunofluorescence studies may be valuable for classifying liver diseases. It is also indicated that humoral immunological mechanisms are in some way involved.

0259 INFLUENCE OF AGE, SEX AND DISEASE ON THE DIAMETER OF THE COMMON BILE DUCT. *(Dut.)* Holtzer, J. D.; Endeman, H. J. (Univ. Hosp., Utrecht, Netherlands). *Tijdschr. Gastroenterol.* 15(5):403-405, 1972.

0260 IMPROVED DEMONSTRATION OF THE SMALL AXIAL HIATUS HERNIAE BY PHARMACORADIOGRAPHY. *(Ger.)* Brandi, H. -G.; Hildebrandt, E. (Radiol. Clin., Dresden-Friedrichstadt, Germany). *Radiol. Diag.* [*Berl.*] 14(1):31-38, 1973.

0261 RESULTS OF THE LUNDH TEST OF PANCREATIC FUNCTION. *(Ger.)* Aenishanslin, W. H.; Kayasseh, L.; Stalder, G. A. (Univ. Basel Med. Sch., Switzerland). *Dtsch. Med. Wochenschr.* 98(46):2192-2196, 1973.

0262 THE APPLICATION OF ANALYTICAL ELECTRON MICROSCOPY TO THE STUDY OF DISEASED BIOLOGICAL TISSUE. *(E.)* Henderson, W. J.; Chandler, J. A.; Blundell, G.; Griffiths, C. (Tenovus Inst. Cancer Res., Cardiff, Wales). *J. Microsc.* 99(2): 183-192, 1973.

0263 NONSPECIFICITY OF HEPATITIS B ANTIGEN DETECTED WITH IODINE-125-LABELED ANTIBODY. *(E.)* Overby, L. R.; Decker, R. H.; Ling, C. M. (Abbott Lab., North Chicago, Ill.). *Science* 182(4119):1368-1371, 1973.

0264 COMPARISON OF INTRAVENOUS AND PERORAL GALACTOSE ELIMINATION TESTS WITH AND WITHOUT ETHANOL IN DIFFERENT CLINICAL CONDITIONS. *(E.)* Kesaniemi, Y. A.; Kurppa, K. O.; Salaspuro, M. P.

(Dept. Clin. Chem., Univ. Helsinki, Finland). *Scand. J. Gastroent.* 8(7):593-598, 1973.

0265 SIGNIFICANCE OF THE NONFILAMENT COUNT IN REGIONAL ENTERITIS. *(E.)* Van Duyn, J. (no affil.). *Clin. Med.* 80(11):21-26, 1973.

0266 NEW TECHNIC FOR SMALL INTESTINAL FIBEROSCOPY. *(E.)* Ogoshi, K.; Hara, Y.; Ashizawa, S. (Cancer Ctr., Niigata Hosp., Japan). *Gastrointest. Endosc.* 20(2):64-65, 1973.

0267 DIAGNOSTIC CRITERIA FOR THE EVALUATION OF THE ENDOSCOPIC PANCREATOGRAM. *(E.)* Silvis, S. E.; Rohrmann, C. A.; Vennes, J. A. (VA Hosp., Minneapolis, Minnesota). *Gastrointest. Endosc.* 20(2):51-55, 1973.

0268 DETECTION OF HEPATITIS B ANTIBODY BY RADIOELECTROCOMPLEXING. *(E.)* Simons, M. J. (Immunol. Res. Train. Ctr., Univ. Singapore). *Bull. W. H. O.* 48(4):499-501, 1973.

0269 CHRONIC PANCREATITIS. DIAGNOSIS USING PERDUODENOSCOPIC WIRSUNGOGRAPHY. *(Fr.)* Heully, F.; Gaucher, P.; Jeanpierre, R.; Laurent, J.; Watrin, B. (Saint-Julien Hosp., Nancy, France). *Nouv. Presse Med.* 2(41):2721-2727, 1973.

0270 RAPID SEROLOGICAL METHODS FOR THE DEMONSTRATION OF ENTAMOEBA-HISTOLYTICA ACTIVITY. *(E.)* Sodeman, W. A.; Dowda, M. C. (Med. Coll. Ohio, Toledo). *Gastroenterology* 65(4):604-607, 1973.

0271 RADIOLOGY OF THE LIVER AND BILIARY TRACT. *(E.)* Wise, R. E.; Scholz, F. J. (Lahey Clin. Found., Boston, Mass.). *Gastroenterology* 65(6):967-985, 1973.

0272 ENDOSCOPIC PHOTOGRAPHY - SPECIAL CAMERAS FOR PHOTOGRAPHY INSIDE THE BODY WITHOUT OPERATION. *(Ger.)* Pangerl, F. (no affil.). *G. I. T. Fachz. Lab.* 17(5):469-472, 1973.

0273 BIOCHEMICAL METHODS FOR DETERMINING ORGAN-SPECIFIC SERUM PHOSPHATASES AND THEIR APPLICATION IN THE DIAGNOSIS OF LIVER AND BONE DISEASES. *(Cz.)* Stephan, J.; Volek, V. (Fac. Gen. Med., Charles Univ., Praque, Czechoslovakia). *Venitr. Lek.* 18(10):1003-1015, 1972.

0274 SERUM ALANINE AMINOPEPTIDASE IN THE DIAGNOSIS OF DISEASES OF THE LIVER, BILIARY TRACT, AND PANCREAS. *Cz.)* Vokurkova, I.; Tovarek, J. (Med. Fac., J. E. Purkyne Univ., Brno, Czechoslovakia). *Venitr. Lek.* 18(10):1016-1022, 1972.

0275 NON-SURGICAL, POSTOPERATIVE EXPLORATION OF THE EXTRAHEPATIC BILE DUCTS UNDER FLUOROSCOPIC CONTROL. *(E.)* Domellof, L.; Karlsson, K. I. (Sahlgrenska Hosp., Goteborg, Sweden). *Acta Chir. Scand.* 139(5):449-451, 1973.

0276 PREOPERATIVE FINE-NEEDLE ASPIRATION BIOPSY. *(E.)* Halveg, A. B.; Sterling, N.; Henriques, U. V. (Central Hosp., Slagelse, Denmark). *Acta Chir. Scand.* 139(5):452-454, 1973.

0277 CARCINO EMBRYONIC ANTIGENS (CEA) AND NON-SPECIFIC CROSS-REACTING ANTIGENS IN FECES. *(E.)* Hirsch-Marie, H.; Chavanel, G.; Burtin, P. (Saint-Antoine Hosp., Paris, France). *Digestion* 9(3):193-198, 1973.

0278 TIP OF THE LIVER IN INTUSSUSCEPTION OF THE BOWEL IN INFANCY AND CHILDHOOD. *(E.)* Jorulf, H. (Children's Hosp., Stockholm, Sweden). *Acta Radiol.* [*Diagn.*] *(Stockh.)* 14(1):26-32, 1973.

0279 ELECTROLYTES OF THE GASTRIC JUICE IN HEALTH AND GASTRODUODENAL DISEASES. *(E.)* Meeroff, J. C.; Rofrano, J. A.; Meeroff, M. (Sanatorio Metropolitano, Buenos Aires, Argentina). *Am. J. Dig. Dis.* 18(10):865-872, 1973.

0280 "OPEN-TUBE" VS. FIBEROPTIC ESOPHAGOSCOPY FOR EVALUATION OF ESOPHAGEAL VARICES. *(E.)* Dagradi, A. E.; Lee, E. R.; Rodiles, D.; Lockareff, S. (Long Beach VA Hosp., Calif.). *Am. J. Gastroenterol.* 60(3):240-249, 1973.

0281 ABERRANT PANCREAS. AN ENDOSCOPIC DIAGNOSIS. *(E.)* Nebel, O. T.; Farrell, R. L.; Kirchner, J. P.; Maciomus, R. F. (Naval Hosp., Philadelphia, Pa.). *Am. J. Gastroenterol.* 60(3):295-300, 1973.

0282 HODGKIN'S DISEASE WITH GIARDIASIS. *(E.)* Ruoff, M.; Marshak, R. H.; Lindner, A. E. (New York Univ. Sch. Med., New York). *Am. J. Gastroenterol.* 60(3):301-304, 1973.

0283 POSITION OF THE DUODENAL BULB AND LIVER SIZE. *(E.)* Kattan, K. R.; Moskowitz, M. (Longview State Hosp., Cincinnati, Ohio). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 119(1):78-84,1973.

0284 METHODS OF MEASURING BILE ACIDS IN BILE AND FECES. *(E.)* Ravi Subbish, M. T. (Mayo Clin., Rochester, Minn.). *Ann. Clin. Lab. Sci.* 3(5):362-368, 1973.

0285 LAPAROSCOPY IN PRIMARY LIVER CANCER IN THE ADULT. *(Fr.)* Etienne, J. P.; Chaput, J. C.; Feydy, P.; Gueroult, N. (Antoine Beclere

Hosp., Clamart, France). *Ann. Gastroenterol. Hepatol. (Paris)* 9(1):49-56, 1973.

0286 RADIOLOGY OF BENIGN AND MALIGNANT ESOPHAGEAL TUMORS. *(Fr.)* Brombart, M. (Inst. Radiol. Diagnosis, Univ. Brussels, Belgium). *Ann. Gastroenterol. Hepatol. (Paris)* 9(2):109-138, 1973.

0287 OPERATIVE CHOLANGIOGRAPHY USING A 6:1 CRISSCROSSED GRID. *(E.)* Shipps, F.; McKirdie, M. (Good Samaritan Hosp., Portland, Oregon). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 119(1):46-51, 1973.

0288 ROENTGENOLOGIC FINDINGS IN RECURRENT PYOGENIC CHOLANGITIS. *(E.)* Wastie, M. L.; Cunningham, I. G. E. (Univ. Hosp., Kuala Lumpur, Malaysia). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 119(1):71-76, 1973.

0289 ANGIOGRAPHY IN BLUNT HEPATIC TRAUMA. *(E.)* Levin, D. C.; Watson, R. C.; Sos, T. A.; Baltaxe, H. A. (Downstate Med. Ctr., Brooklyn, N.Y.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 119(1):95-100, 1973.

0290 HEPATIC SCINTIGRAPHY. *(Fr.)* Desgrez, A. (Kremlin-Bicetre Univ. Hosp. Ctr., France). *Ann. Med. Interne (Paris)* 123(8/9):727-730, 1972.

0291 VALUE OF COLOFIBROSCOPY DURING SURGERY IN THE DIAGNOSIS OF BENIGN TUMORS OF THE COLON. *(Fr.)* Debray, C.; Crespon, B.; Housset, P.; Nardi, C.; Edelmann, G.; Le Roy, A.; Paolaggi, J. A. (Bichat Hosp., Paris, France). *Ann. Med. Interne (Paris)* 124(4):333-336, 1973.

0292 ENDOSCOPIC STUDY OF GASTRIC ULCER IN HIATAL HERNIA. *(Fr.)* Moulinier, B.; Bruhiere, J.; Grenier Boley, P.; Grimaud, A.; Nosek, S.; Lambert, R. (Edouard Herriot Hosp., Lyon, France). *Arch. Fr. Mal. App. Dig.* 62(1):11-15, 1973.

0293 ENDOSCOPIC DIAGNOSIS OF GASTRIC NON EPITHELIAL TUMORS. *(Fr.)* Vlinchet, O.; Yoshii, Y.; Prolla, J.; Kirsner, J. B. (Aichi Cancer Hosp., Nagoya, Japan). *Arch. Fr. Mal. App. Dig.* 62(5):385-392, 1973.

0294 PNEUMOPANCREATOTOMOGRAPHIC CHARACTERISTICS OF EXPANSIVE PANCREATIC LESIONS. *(It.)* De Florio, L.; Moretti, S.; Roversi, R.; Gavelli, G. P. (Inst. Radiol., Univ. Bologna, Italy). *Ann. Radiol. Diagn.* 44(3):263-282, 1973.

0295 DIAGNOSTIC VALUE OF CHROMATIC DUODENAL TUBING IN DISEASES OF THE GALLBLADDER. *(Rus.)* Fischenko, A. Ya. (N. I. Pirogov Med. Inst., Vinitsa, USSR). *Klin. Med. (Mosk.)* 50(7):55-58, 1972.

0296 DIFFERENCES OF THE INDOCYANINE GREEN EXCRETION RATE IN LIVER DISEASES OF VARYING SEVERITY. *(Ger.)* Brugmann, E. (Med. Clin., Univ. Rostock, Germany). *Z. Gesamte Inn. Med.* 28(17):523-526, 1973.

0297 PROBLEMS IN THE DIAGNOSIS OF MEGACOLON IN NEWBORNS. *(E.)* Snobl, O.; Mydlil, V. (Fac. Pediatric Med., Charles Univ., Prague, Czechoslovakia). *Cesk. Pediatr.* 28(4):197-200, 1973.

0298 THE RADIOLOGY OF PERFORATED OESOPHAGUS. *(E.)* Parkin, G. J. S. (Leeds (St. James's) Univ. Hosp., England). *Clin. Radiol.* 24(3):324-332, 1973.

0299 BLEEDING IN THE UPPER PART OF THE GASTROINTESTINAL TRACT. *(Cz.)* Bitter, J.; Kvasnicka, G. (Reg. Hosp., Usti nad Labem, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 27(2):49-56, 1973.

0300 RADIOLOGICAL INVESTIGATION IN JAUNDICE. *(Sw.)* Marions, O.; Wiechel, K. L. (Sodersjukhus, Stockholm, Sweden). *Lakartidningen* 70(10):951-956, 1973.

0301 EVALUATION OF PARENCHYMAL LIVER FUNCTION: VALUE OF THE INTRAVENOUS GALACTOSE CLEARANCE TEST. STUDY MADE BY MULTIDIMENSIONAL STATISTICAL ANALYSES. *(Fr.)* Hecht, Y.; Benamar, A.; Touboul, J. P.; Guedri, H. E.; Nakache, J. P.; Salmon, D. (St. Antoine Hosp., Paris, France). *Med. Chir. Dig.* 2(2):81-90, 1973.

0302 AUSTRALIA ANTIGEN (Au/SH) AND ITS SIGNIFICANCE IN THE DIAGNOSIS AND PREVENTION OF SERUM HEPATITIS. III. STUDY OF THE OCCURENCE OF ANTI Au/SH ANTIBODIES. *(Slov.)* Galikova, J.; Pokorna, G.; Hrubisko, M.; Kubanova, E. (Fac. Internal Med., Bratislava, Czechoslovakia). *Bratisl. Lek. Listy* 59(1):39-44, 1973.

0303 EMERGENCY ENDOSCOPY IN UPPER GASTROINTESTINAL BLEEDING. *(Ger.)* Miederer, S. E.; Stadelmann, O.; Raschke, E. (Med. Polyclin., Univ. Bonn, Germany). *Z. Gastroenterol.* 10(6):399-402, 1972.

0304 ARTERIOGRAPHIC DEMONSTRATION OF HYDATID CYSTS OF THE LIVER. V. POSTOPERATIVE RECURRENCE OF HYDATID CYSTS. *(Sp.)* Muro, J.; San Martin, P.; Ortiz-Vazquez, J.; Hita, J. (La Paz Clin., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 38(3):299-312, 1972.

0305 ENDOSCOPIC AND BIOPSY FINDINGS IN STOMACH ULCERS AND CARCINOMAS. *(Ger.)* Kompisch, M. (Bergedorf Gen. Hosp., Hamburg, Germany). *Med. Welt* 23(27/28):976-977, 1972.

0306 AN EVALUATION OF LUNG UPTAKE OF COLLOID DURING LIVER IMAGING. *(E.)* Keyes, Jr., J. W.; Wilson, G. A.; Quinones, J. D. (Univ. Michigan Med. Ctr., Ann Arbor). *J. Nucl. Med.* 14(9):687-691, 1973.

0307 DIAGNOSTIC SIGNIFICANCE OF THE LAYERING PHENOMENA IN THE GALLBLADDER IN CHOLECYSTOGRAPHY AND CHOLEGRAPHY. *(Ger.)* Lindqvist, M.; Zaltzman, G. F. (Dept. Roentgen Diagnosis, Univ. Umea, Sweden). *Acta Radiol. (Diag.) (Stockh.)* 12(5):625-628, 1972.

0308 X-RAY FINDINGS OF GASTRIC ULCER SCARS. *(E.)* Igarashi, T.; Gonoi, T. (Fukushima Med. Coll., Japan). *Jap. J. Clin. Oncol.* 12(2): 99-108, 1972.

0309 DIAGNOSTIC VALUE OF DYSPHAGIA. II. ZENKER'S DIVERTICULUM ASSOCIATED WITH AN ULCER-LIKE NICHE IN THE UPPER MIDDLE THIRD (VERTICAL PART) OF THE SMALLER CURVATURE OF THE STOMACH (NEOPASTIC TYPE). *(Sp.)* Triadu, I. (Pujol and Brull Clin., Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 40(6):675-694, 1973.

0310 CHOLEDOCHAL CYST DEMONSTRATED BY I^{131} ROSE BENGAL SCANNING. REPORT OF A CASE. *(E.)* Tada, S.; Yasukochi, H.; Shida, H.; Motegi, F.; Fukuda, A. (Br. Hosp., Univ. Tokyo, Japan). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 116(3):587-589, 1972.

0311 RADIOIMMUNOASSAY OF HEPATITIS B VIRUS-ASSOCIATED (AUSTRALIA) ANTIGEN EMPLOYING ^{125}I-ANTIBODY. *(E.)* Overby, L. R.; Miller, J. P.; Smith, I. D.; Decker, R. H.; Ling, C. M. (Abbott Labs., North Chicago, Ill.). *Vox Sang. [Suppl.]* 24:102-113, 1973.

0312 THE VALUE OF FIBROGASTROSCOPY IN THE DIAGNOSIS OF GASTRIC ULCER: OUR EXPERIENCE WITH 145 CASES. *(Sp.)* Mino, G.; Diago, A.; Mardomingo, P.; Cano, A.; Muro, J.; Jaramillo, J. L. (La Paz Munic. Sanit., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 40(4):409-420, 1973.

0313 THE DIAGNOSTIC VALUE OF SERUM IRON AND COPPER IN VIRAL HEPATITIS IN CHILDREN. *(Rus.)* Popovich, P. I. (Kishinev Med. Inst., USSR). *Zdravookhranenie* (2):18-22, 1973.

0314 COMPARATIVE STUDY OF VARIOUS TECHNIQUES FOR IMMUNOLOGICAL DIAGNOSIS OF EXPERIMENTAL HEPATOBILIARY FASCIOLIASIS IN THE SHEEP AND THE EFFECT OF TREATMENT ON ANTIBODY PERSISTENCE. *(Fr.)* Benex, J.; Guilhon, J.; Barnabe, R. (no affil.). *Bull. Soc. Pathol. Exot.* 66(1):116-128, 1973.

0315 LOW VOLTAGE COUNTERIMMUNOELECTROPHORESIS FOR THE DETECTION OF AUSTRALIA ANTIGEN. *(E.)* McKee, A. P.; Pollack, W.; Tripodi, D. (Ortho Res. Fdn., Raritan, N.J.). *Vox Sang. [Suppl.]* 24: 80-83, 1973.

0316 RADIOIMMUNOPRECIPITATION ASSAY FOR AUSTRALIA ANTIBODY. *(E.)* Schober, A.; Thomssen, R. (Inst. Hyg., Univ. Gottingen, Germany). *Vox Sang. [Suppl.]* 24:129-136, 1973.

0317 VALUE OF CHOLESTATIC ENZYMES IN HEPATOBILIARY DISEASES. *(Ger.)* Peters, J. E.; Otto, L.; Grundig, C. A.; Nilius, R.; Zipprich, B.; Eismann, R.; Busse, H. J.; Thulin, H.; Muller, G. (Med. Acad., Magdeburg, Germany). *Z. Gesamte Inn. Med.* 28(18):273-276, 1973.

0318 RADIOGRAPHIC FILMS OF THE BILIARY TRACT AS RELATED TO SEX. *(It.)* Madonia, G.; Coucourde, F.; Berti, A. (Inst. Radiol. Phys. Ther., Univ. Pavia, Italy). *Ann. Radiol. Diagn.* 44(4):353-360, 1973.

0319 RADIOGRAPHIC FILMS OF THE BILIARY TRACT AS RELATED TO AGE. *(It.)* Coucourde, F.; Madonia, G.; Berti, A. (Inst. Radiol. Phys. Ther., Univ. Pavia, Italy). *Ann. Radiol. Diagn.* 44(4): 361-374, 1973.

0320 A RAPID JEJUNAL BIOPSY TECHNIQUE AIDED BY METOCLOPRAMIDE: A DOUBLE-BLIND TRIAL WITH 50 PATIENTS. *(E.)* Moshal, M. G. (King Edward VIII Hosp., Natal, Durban, South Africa). *Postgrad. Med. J.* 49(4):87-88, 1973.

0321 ENZYMATIC PARAMETERS IN THE DIAGNOSIS OF FATTY LIVER. *(Ger.)* Nilius, R.; Peters, J. E.; Farr, W.; Grundig, C. A.; Mantel, E.; Otto, L.; Busse, H. J.; Zipprich, B.; Eismann, R. (1st Med. Clin., Martin Luther Univ., Wittenberg, Germany). *Z. Gesamte Inn. Med.* 28(17):268-270, 1973.

0322 COLONOSCOPY: 100 EXAMINATIONS. *(E.)* Moshal, M. G.; Baker, L. W.; Lautre, G.; Bader, E. (King Edward VIII Hosp., Natal, South Africa). *S. Afr. J. Surg.* 11(2):73-78, 1973.

0323 THE VALUE OF RETROGRADE CHOLANGIOGRAPHY WITH WATER-SOLUBLE CONTRAST MEDIUM IN EXAMINATION OF SUBJECTS WITH FISTULAS BETWEEN THE

BILE DUCTS AND GASTROINTESTINAL TRACT. *(Ger.)* Solc, P.; Svab, L.; Dobry, K. (Czechoslovakian State Bath, Karlovy Vary). *Vnitr. Lek.* 18(12):1179-1186, 1972.

0324 ENDOSCOPIC PANCREATOCHOLANGIOGRAPHY. *(E.)* Nebel, O. T.; Fornes, M. F. (Naval Hosp., San Diego, Calif.). *Am. J. Dig. Dis.* 18(12):1042-1050, 1973.

See also, 0390, 0658, 0660, 0773.

GASTROINTESTINAL DISEASES

ESOPHAGUS

0325 DISAPPEARANCE OF MULTIPLE ESOPHAGEAL DIVERTICULA FOLLOWING TREATMENT OF ESOPHAGITIS: SERIAL ENDOSCOPIC, MANOMETRIC, AND RADIOLOGIC OBSERVATIONS. *(E.)* Bender, M. D.; Haddad, J. K. (VA Hosp., San Francisco, Calif.). *Gastrointest. Endosc.* 20(1):19-22, 1973.

Multiple esophageal diverticula were demonstrated endoscopically, but not radiologically, in a 56-yr-old white male in association with hiatus hernia, acid reflux, and esophagitis. The diverticula disappeared during the course of intensive medical therapy of esophagitis. Serial manometric studies, combined with acid perfusion, helped elucidate a possible pathogenetic mechanism. This case suggests that a reversible, treatable, "pre-diverticular" stage occurs in the natural history of esophageal diverticula. It is suggested that patients with radiographic or endoscopic diverticula be evaluated with serial endoscopic, roentgenologic, and manometric studies.

0326 A CLINICO-PATHOLOGICAL STUDY OF SOME FACTORS INFLUENCING SURVIVAL IN CANCER OF THE OESOPHAGUS: A SURVEY OF TEN YEARS' EXPERIENCE. *(E.)* Nicks, R.; Green, D.; McClatchie, G. (Roy. Prince Alfred Hosp., Sydney, Australia). *Aust. J. Surg.* 43(1):3-13, 1973.

Records of 332 patients with esophageal carcinomas seen over a 10-yr period were reviewed. Of the 332 carcinomas, 37 were situated in the upper cervical and hypopharyngeal regions; 295 were thoracic in which cases the lower third and cardia were more frequently affected (156 cases as compared with 91 in the middle third and 30 in the upper). The most frequent symptoms were increasing dysphagia with loss of appetite. Many patients also experienced pain localized in the cervical region; a smaller number experienced vomiting, hoarseness, and cough. In 314 cases where the histological type was identified, the tumor was a squamous cell carcinoma in 213 cases, an adenocarcinoma in 78, and of undifferentiated type in 23 cases. The carcinoma had advanced through the wall of the esophagus, had involved the lymphatic glands, or had metastasized in 305 of the 332 patients. A severe grade of anaplasia was noted in 156, moderate in 67, and minimal in 55. The 5-yr survival rate was 4%. Survival in terms of the site of carcinoma suggests that those located in the upper thoracic and lower cervical regions are fatal. The only 3-yr survivors were those patients undergoing resection or radical radiotherapy, 15% and 8% survivors, resp. The lack of any 2-yr survivors among patients where excision was incomplete emphasizes the need for extensive en-bloc local excision well beyond the carcinoma, throughout its length, and including periesophageal tissues, pleura, and all draining lymph nodes.

0327 ADENOCARCINOMA IN THE COLUMNAR EPTHELIAL LINED LOWER (BARRETT) OESOPHAGUS. *(E.)* Hawe, A.; Payne, W. S.; Weiland, L. H.; Fontana, R. S. (Mayo Clin., Rochester, Minn.). *Thorax* 28(4): 511-514, 1973.

Patients (4 males and 1 female, aged 39-75 yr) with Barrett esophagus developed adenocarcinoma of the esophagus at sites cephalad from the anatomic cardia but separated from it by a definite segment of columnar lined esophagus. Similar cases (12) have been reported in the literature. Of 85 patients in whom a clinical diagnosis of benign Barrett esophagus was made in the 20-yr period 1950-69, 2 subsequently developed esophageal cancer. Since its description in 1950 by Barrett, the columnar epithelial-lined lower esophagus has been encountered with increasing frequency. The full clinical implications of this unusual condition are only partially appreciated at this time, and the present results support earlier suggestions that the condition may be premalignant.

0328 EXPERIMENTAL AND CLINICAL STUDIES ON THE ACTION MECHANISM OF FUNDOPLICATION. *(Ger.)* Siewert, R.; Jennewein, H. M.; Waldeck, F.; Peiper, H. J. (Clin. Gen. Surg., Univ. Gottingen, Germany). *Langenbecks Arch. Chir.* 333(1):5-22, 1973.

Pressure studies were performed on dogs and patients who had undergone fundoplication to determine what happens to the lower esophageal sphincter and whether the fundal cuff can act as a sphincter. In the dog, myotomy alone had little effect on resting pressure at the sphincter but did cause gastroesophageal reflux. More pronounced changes were noted in sphincter pressure after injection of pentagastrin, carbachol and, to a lesser extent, glucagon. Total circular myomectomy reduced sphincter pressure to 3.6 mm Hg and caused reflux; peptide hormones no longer had an effect on sphincter pressure. Fundoplication in dogs with intact lower esophageal sphincters resulted in a high-pressure zone which acted as a normal sphincter in its responses to polypeptide hormones. Similar results were obtained by fundoplication following myotomy. Combination of fundoplication with total myomectomy gave a resting pressure of 13.6 mm Hg in the fundal cuff which was more than doubled (33.3 ± 10.8 mm Hg) by pentagastrin but was reduced only slightly by glucagon. No reflux was detected in dogs which had undergone any of these fundoplication procedures. Thus, in fundoplication the fundal cuff forms a high-pressure zone which reacts to gastrointestinal hormones in the same way as the lower esophageal sphincter and prevents gastrointestinal reflux. These findings were confirmed on 15 patients who had undergone fundoplication. *In vitro* experiments on isolated muscle strips from the dog showed that anterior wall of the fundus, right under the cardia, reacted to pentagastrin in the same way as strips from the lower esophageal sphincter. In contrast, strips of fundal mucosa near the larger curvature reacted only slightly to large doses of pentagastrin. Thus, it is important that the fundal cuff be formed from the anterior fundus close to the cardia since only muscles from this area can react in a way similar to those of the lower esophageal sphincter.

0329 INTRAMURAL DIVERTICULOSIS OF THE ESOPHAGUS. *(E.)* Sperling, H. V.; D'Altorio, R. A. (Western Pennsylvania Hosp., Pittsburgh). *Am. J. Dig. Dis.* 18(11):978-982, 1973.

0330 CANCER OF THE GASTROINTESTINAL TRACT. II.. ESOPHAGUS: TREATMENT-LOCALIZED AND ADVANCED. *(E.)* Rubin, P. (Strong Mem. Hosp., Rochester, N.Y.). *J. A. M. A.* 227(2):184-187, 1974.

0331 PARAESOPHAGEAL HERNIA. *(E.)* Ozdemir, I. A.; Burke, W. A.; Ikins, P. M. (Div. Thorac. Surg., State Univ. New York, Syracuse). *Ann. Thorac. Surg.* 16(6):547-554, 1973.

0332 OESOPHAGEAL CANCER STUDIES IN THE CASPIAN LITTORAL OF IRAN: THE CASPIAN CANCER REGISTRY. *(E.)* Mahboubi, E.; Kmet, J.; Cook. P. J.; Day, N. E.; Ghadirian, P.; Salmasizadeh, S. (Inst. Public Hlth. Res., Univ. Teheran, Iran). *Br. J. Cancer* 28(3):197-214, 1973.

0333 STUDY OF RECORDS OF 165 ADULTS OPERATED ON FOR HIATUS HERNIA. *(Fr.)* Rudler, J. C. (Canton. Hosp., Geneva, Switzerland). *Rev. Fr. Gastroenterol.* (86):11-26, 1973.

0334 HYPERTROPHIC PYLORIC STENOSIS COMPLICATING ESOPHAGEAL ATRESIA. *(E.)* Glasson, M. J.; Sandrevics, V.; Cohen, D. H. (Roy. Alexandra Hosp. Child., Camperdown, Australia). *Surgery* 74(4):530-535, 1973.

0335 THE SAFETY OF INTUBATION IN PATIENTS WITH ESOPHAGEAL VARICES. *(E.)* Lopez-Torres, A.; Waye, J. D. (no affil.). *Am. J. Dig. Dis.* 18(12): 1032-1034, 1973.

336 PEPSINOGENS IN EPITHELIUM OF BARRETT'S ESOPHAGUS. *(E.)* Mangla, J. C.; Kim, Y.; uarasci, G.; Schenk, E. A. (Monroe Comm. Hosp., ochester, N.Y.). *Gastroenterol.* 65(6):949-955, 1973.

337 LATERAL CERVICAL ESOPHAGOPLASTY. *(Sp.)* Barroso, F. L.; Chatagnier, R.; Caltabiano, . (Fac. Med. Surg., Rio de Janeiro, Brazil). *Arq. astroent.* 10(2):89-95, 1973.

338 EARLY CARCINOMA OF THE ESOPHAGUS: REPORT OF A CASE. *(Fr.)* Moulinier, B.; Oliveira, C.; Lambert, R.; Ruet, D.; Lesbros, F.; Brault, A. (Edouard-Herriot Hosp., Lyon, France). *Arch Fr. Mal. App. Dig.* 62(6):489-494, 1973.

0339 ESOPHAGITIS AND THE INDICATION FOR SURGICAL TREATMENT OF PATIENTS WITH A HIATUS HERNIA. *(Dut.)* van Gelder, A. (Juliana Hosp., Apeldoorn, Netherlands). *Ned. Tijdschr. Geneeskd.* 117(6):213-215, 1973.

0340 CORRELATION OF MANOMETRIC AND ENDOSCOPIC DATA FROM THE ESOPHAGOGASTRIC AREA. *(E.)* Rinaldo, J. A.; Singaracharlu, P.; Hiller, G.; Gelzayd, E. (Providence Hosp., Southfield, Mich.). *Gastrointest. Endosc.* 20(2):61-63, 1973.

0341 ESOPHAGEAL FUNCTION STUDIES: A CLINICAL APPROACH TO THE EVALUATION OF ESOPHAGEAL DISEASE. *(E.)* Elkins, R. C.; Greenfield, L. J. (Univ. Oklahoma Hlth. Sci. Ctr., Oklahoma City). *Oklahoma State Med. Ass.* 66(11):456-460, 1973.

0342 THE MEGAESOPHAGUS. *(Fr.)* Hillemand, P. (no affil.). *Gazette Med.* 80(24):4015-4026, 1973.

0343 ESOPHAGEAL DIVERTICULUM. *(Fr.)* Dupuy, P.; Coulbois, J. (no affil.). *Gazette Med.* 80(15):2577-2583, 1973.

0344 PERMANENT INTUBATION IN TERMINAL CANCER OF THE OESOPHAGUS AND CARDIA. A NEW TUBE. *(E.)* Schetrumpf, J. R. (St. James's Hosp., Leeds, England). *Thorax* 28(4):533-534, 1973.

0345 CARCINOMA IN SITU OF THE ESOPHAGUS (EARLY ESOPHAGEAL CANCER). A CASE REPORT AND A REVIEW OF THE LITERATURE. *(E.)* Seifert, E.; Borst, H. H.; Ostertag, H.; Stender, H. St.; Braschke, M.; Misaki, F.; Atay, Z. (Med. Clin. Hannover, Germany). *Endoscopy* 5(3):147-153, 1973.

0346 THE SIGNIFICANCE OF SCHATZKI'S RING IN ESOPHAGEAL DISEASE. *(Fr.)* Lortat-Jacob, J. L.; Giuli, R.; Estenne, B.; Calmat, A. (Beaujon Hosp., Paris, France). *Lyon Chir.* 69(4):248-251, 1973.

0347 RUPTURE OF THE DISTAL OEOSPHAGUS WITH INVAGINATION AND PROLAPSE OF THE STOMACH

INTO THE RIGHT PLEURAL CAVITY. AN UNUSUAL COMPLICATION OF LAPAROSCOPY. *(E.)* Althaus, U.; Halter, F.; Roth, F. (Dept. Thoracic Cardiovasc. Surg., Univ. Berne, Switzerland). *Endoscopy* 5(3):153-156, 1973.

See also, 0097, 0257, 0260, 0280, 0286, 0292, 0298, 0359, 0616, 0624, 0671.

STOMACH

0348 SUPERFICIAL GASTRIC EROSIONS. RESPONSE TO SURGICAL TREATMENT. *(E.)* Wilson, W. S.; Gadacz, T.; Olcott, III, C.; Blaisdell, F. W. (San Francisco Gen. Hosp., Calif.). *Am. J. Surg.* 126(2):133-140, 1973.

A study was made of 56 patients who underwent surgery for hemorrhage from superficial gastric erosions. In 28 patients trauma, sepsis, and recent surgery were predisposing factors. A second group of 28 patients consisted of those with alcoholism, excessive aspirin intake, low cardiac output, diabetes, and idiopathic factors. These 2 groups did not differ significantly in age nor in postoperative rebleeding rates. Of 21 patients undergoing vagotomy and drainage with systematic suture ligation of visible erosions, whether or not they were bleeding at gastrotomy, rebleeding occured in 2 (9.5%). Of 19 patients who had vagotomy and drainage without suture ligation, rebleeding occurred in 9 (47%). This difference is statistically significant. Of 9 patients with partial gastrectomy without vagotomy, 4 (44%) had rebleeding; 1 total gastrectomy resulted in death from sepsis. Rebleeding rates correlated well with the amount of blood transfused preoperatively. Mortality correlated better with the severity of the patient's illness prior to bleeding than with the operation performed. A study of gastric physiology and mucosal microvascular anatomy, suggests that bleeding results from previous or recurrent episodes of mucosal ischemia and that vagotomy lessens the tendency to further erosion by decreasing the acid output in these stressed patients. Suture ligation is useful in preventing further venous hemorrhage from erosions already present.

0349 PSEUDOLYMPHOMA OF THE STOMACH. *(E.)* Wright, C. J. E. (Dept. Pathol., Univ. Coll., Cork, Ireland). *Hum. Pathol.* 4(3):305-318, 1973.

Pseudolymphoma of the stomach was diagnosed in 5 patients (4 males and 1 female aged 36-62 yr). The duration of the symptoms ranged from 1-10 yr. Malignancy was apparent in 3 cases, based on clinical and operative impressions, and was questionable in the remaining 2. Partial gastrectomy was performed in 4 cases, total gastrectomy in 2 (1 of the former patients returned 14 months later for the total operation). Survival ranged from 6 weeks to 22 yr with this latter patient still living. These cases shared several points in common such as long clinical history, site of involvement, notably flat lesions, presence of ulceration and fibrosis, and distinctive lymphoreticular proliferation. These features suggest an entity distinct from malignant lymphoma. It is suggested that the lack of nonneoplastic lesions closely simulating reticulum cell sarcoma should be enough to avoid confusing that disease with pseudolymphoma of the stomach.

0350 ANTRO-PYLORIC GASTRINOMA ASSOCIATED WITH PANCREATIC NESIDIOBLASTOSIS AND PROLIFERATION OF ISLETS. *(E.)* Larsson, L. I.; Ljungberg, O.; Sundler, F.; Hakanson, R.; Svensson, S. O.; Rehfeld, J.; Stadil, F.; Holst, J. (Dept. Histol., Univ. Lund, Sweden). *Virchows Arch. (Pathol. Anat.)* 360(4):305-314, 1973.

An adenoma in the antropyloric mucosa of a 66-yr-old male patient with recurrent duodenal ulcers was identified by immunofluorescence as a gastrinoma. Resected pancreatic tissue showed greatly increased numbers of islets and ducts. Insulin and glucagon cells were revealed by immunofluorescence not only in the islets but also in the duct epithelium. Signs suggesting neoformation of islets from the duct epithelium were observed. The combination of gastrinoma and pancreatic nesidioblastosis with proliferation of islets may be part of a more generalized endocrine disorder. Alternatively, the islet proliferation may be secondary to trophic influence from the gastrinoma.

0351 GASTRIC EMPTYING IN PATIENTS WITH ACHLORHYDRIA OR HYPOSECRETION OF HYDROCHLORIC ACID. *(E.)* Halvorsen, L.; Dotevall, G.; Walan, A. (Sahlgren's Hosp., Goteborg, Sweden). *Scand. J. Gastroenterol.* 8(5):395-399, 1973.

Gastric emptying was investigated in 21 patients (8 males and 13 females, aged 33-76 yr) with achlorhydria (15 cases) or hyposecretion (6 cases) compared to control subjects (10 males and 9 females, aged 22-63 yr), using the modification of Hunt's method described by George. Half-time as well as emptying time was significantly more rapid in patients with achlorhydria or hyposecretion, 8.7 min and 52.3 min, resp., as compared with 13.4 min and 74.9 min, resp., for control subjects. No correlation was noted between half-time or emptying time and age. No significant sex differences were found among patients or controls. These findings are in contrast with reports using $^{51}CrCl_3$ as non-absorbable gastric indicator. It is suggested that chromic chloride losses by adsorption onto mucus at high pH are considerably greater than those of the phenol red used in the present study. This may partly explain the varying results obtained.

0352 IMMUNE REACTIONS IN DRUG-INDUCED GASTRITIS. *(Fr.)* Cornet, A.; Carnot, F.; Hartmann, L.; Barbier, J. P. (Laennec Hosp., Paris, France). *Sem. Hop. Paris* 49(23):1649-1656, 1973.

In 12 patients with gastritis and 6 controls with dyspepsia, immunofluorescent staining was used to detect cells producing IgA, IgG, and IgM in the fundal mucosa. Of these patients, 6 (3 men and 3 women, aged 23-54 yr) had drug-induced gastritis caused by ingestion of aspirin in 4 cases, aspirin and indomethacine in 1, and aspirin and diazepam in 1; the remaining 6 patients had chronic forms of gastritis. While biopsies from controls contained only 1 or 2 cells producing immunoglobulins in 5 or 6 microscope fields, biopsies from 10 of the 12 patients with gastritis contained large numbers of immunocompetent cells, particularly those producing IgA. Of the remaining 2 patients who had no evidence of immunocompetent cells in the gastric fundus, 1 had agammaglobulinemia and the other was examined 6 days after a suicide attempt in which he ingested aspirin and diazepam; gastroscopic findings were normal at this time. Serum immunoglobulin levels remained almost unchanged in patients with gastritis although serum glycoprotein levels were increased in some cases. In severe drug-induced gastritis lasting change sometimes occurred in glandular tissue. Acute gastritis regressed, but the immunological reaction persisted for a much longer time.

0353 THE TREATMENT OF STRESS ULCER WITH HUMAN GROWTH HORMONE (HGH): CASE REPORT AND HYPOTHESIS ON HGH AND HEMOSTATIS. *(E.)* Vanamee, P.; Winawer, S. J. (no affil.). *Clin. Bull.* 3(2): 54-57, 1973.

0354 IMMUNE PATHOGENESIS OF CHRONIC ATROPHIC GASTRITIS WITH AND WITHOUT PERNICIOUS ANEMIA. *(Ger.)* Hausamen, T. U. (1st Med. Clin., Univ. Dusseldorf, Germany). *Dtsch. Med. Wochenschr.* 98(4):169-173, 1973.

0355 ISOLATED GRANULOMATOUS GASTRITIS. *(Hun.)* Domotor, L.; Dreissiger, L.; Horvath, J.; Koranyi, G. (no affil.). *Orv. Hetil.* 113(28): 1659-1662, 1972.

0356 GASTRIC CHANGES IN BILIARY TRACT AND PANCREATIC DISEASE. *(Ger.)* Herms, G. (Altstadt Reg. Hosp., Magdeburg, Germany). *Z. Gesamte Inn. Med.* 28(17):526-529, 1973.

0357 GASTRIC GAS COMPOSITION IN PATIENTS SUFFERING OF METEORISM. *(Sp.)* Vasquez-Calderon, A.; Cruz Jibaya, J.; Leon Barua, R. (Cayetano Heredia Gen. Hosp., Lima, Peru). *Acta Gastroenterol. Latinoam.* 4(4):153-159, 1972.

0358 ASBESTOS, TALC AND NITRATES IN RELATION TO GASTRIC CANCER. *(E.)* Smith, W. E. (Health Res. Inst., Fairleigh Dickinson Univ., Madison, N.J.). *Am. Ind. Hyg. Assoc. J.* 34(5): 227-228, 1973.

0359 GASTRIC STASIS AND ESOPHAGITIS FOLLOWING VAGECTOMY WITHOUT PYLOROPLASTY. *(E.)* Klein, M. S.; Sherlock, P. (Mem. Hosp. Cancer Allied Dis., New York, N.Y.). *Am. J. Gastroenterol.* 59(4):321-326, 1973.

0360 CHRONIC GASTRITIS ASSOCIATED WITH PEPTIC ULCER: AN ENDOSCOPIC AND HISTOLOGICAL STUDY. *(Fr.)* Lambert, R.; Moulinier, B.; Van Den Put, F.; Grenier Boley, P.; Bruhiere, J. (Edouard Herriot Hosp., Lyon, France). *Arch. Fr. Mal. App. Dig.* 62(1):53-59, 1973.

0361 PRIMARY AMYLOSIS OF THE STOMACH. REPORT OF A CASE AND REVIEW OF THE LITERATURE. *(Fr.)* Coste, T.; Syrota, A.; Texier, J.; Paraf, A. (Franco-Musulman Hosp., Bobigny, France). *Arch. Fr. Mal. App. Dig.* 62(1):67-74, 1973.

0362 ULTRASTRUCTURE OF AND CHANGES IN GASTRIC GLANDS IN CHRONIC GASTRITIS. *(Rus.)* Lisochkin, B. G. (Leningrad Inst. Postgrad. Med., USSR). *Arkh. Patol.* 34(10):11-20, 1972.

0363 CELLS HAVING THE FEATURES OF PARIETAL AND OXYNTIC CELLS IN THE GASTRIC MUCOSA OF PATIENTS WITH CHRONIC GASTRITIS. *(Rus.)* Sharov, V. G. (All Union Sci. Res. Inst. Gastroenterol., Moscow, USSR). *Biull. Eksp. Biol. Med.* 75(6):108-111, 1973.

0364 CONTRIBUTION TO THE PATHOGENESIS OF MILK INTOLERANCE FOLLOWING GASTRECTOMY. *(Cz.)* Pirk, E.; Vulterinova, M.; Skala, I. (Ctr. Res. Metabolism Nutrition, Prague, Cezchoslovakia). *Cesk. Gastroenterol. Vyz.* 27(2): 57-63, 1973.

0365 ASSOCIATION OF GIANT HYPERTROPHIC GASTRITIS WITH STOMACH CANCER AND WITH GASTRIC POLYPOSIS. *(Fr.)* Hureau, J.; Delavierre, P.; Vayre, P.; Levasseur, J. C.; Bourdais, J. P.; Laburthe-Tolra, Y. (Vaugirard Hosp., Paris, France). *Sem. Hop. Paris* 49(28):2042-2046, 1973.

0366 PRIMARY MALIGNANT GASTRIC LYMPHOMA. *(Sp.)* Mardomingo Varela, P.; Cosme, A.; Ortiz Vazquez, J.; Diago, A.; Duran, A. (La Paz Munic. Sanit., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 38(4):429-442, 1972.

0367 THE BEHAVIOR OF GASTRIC JUICE MUCOPROTEINS IN NORMAL SUBJECTS AND UNDER PATHOLOGICAL CONDITIONS (GASTRITIS, PEPTIC ULCER, STEROID GASTROPATHY). *(E.)* Corsini, P.; Mordini, M.; Bellofiore, P. (Civil Hosp., Grosseto, Italy). *Chir. Gastroenterol.* 7(1):11-16, 1973.

0368 SUBMUCOSAL CHANGES IN THE STOMACH. *(Ger.)* Pohlmann, R.; Elster, K. (Inst. Pathol. Anat., Univ. Erlangen-Nurnberg, Erlangen, Germany). *Z. Gastroenterol.* 10(5):325-332, 1972.

0369 INTRAGASTRIC INSTILLATION OF LEVARTERENOL. A METHOD FOR CONTROL OF UPPER GASTROINTESTINAL TRACT HEMORRHAGE. *(E.)* Kiselow, M. C.; Wagner, M. (Med. Coll. Wisconsin, Milwaukee). *Arch. Surg.* 107(3):387-389, 1973.

0370 REACTION TO THIOAMINO COMPOUNDS IN PATIENTS WITH MALIGNANT NEOPLASMS OF THE GASTROINTESTINAL TRACT AND CHRONIC GASTRITIS. *(Rus.)* Lorman, T. B. (Pskov Oblast Oncol. Dispensary, USSR). *Vopr. Onkol.* 19(6):108-110, 1973.

0371 INTRALUMINAL FUNGUS INFECTION IN THE STOMACH. *(Sw.)* Norberg, B.; Tyreman, N. O. (Central Hosp., Uddevalla, Sweden). *Lakartidningen* 70(18):1855-1856, 1973.

See also, 0249, 0255, 0279, 0293, 0305, 0309, 0334, 0344, 0347, 0430, 0463, 0671, 0680, 0692, 0706, 0745.

STOMACH

Peptic Ulcers

0372 STIMULATION OF MURINE GASTRIC HISTIDINE DECARBOXYLASE ACTIVITY BY SHEEP RED BLOOD CELL (SRBC) IMMUNIZATION. *(E.)* Moore, T. C.; Sinclair, M. C.; Lemmi, C. A. E. (Harbor Gen. Hosp., Torrance, Calif.). *Surgery* 74(3):444-446, 1973.

The effect of sheep red blood cell immunization on total stomach histidine decarboxylase activity was studied in 42 inbred Lewis rats from 1-9 days after immunization. ^{14}C-Histidine and pyridoxal phosphate were incubated with stomach tissue for 3 hr, and the ^{14}C-histamine produced was converted to benzenesulfonyl histamine (BSH) which was then purified by repeated recrystallization. The mean increase in histidine decarboxylase activity was from 77,061 to 516,572 cpm/100 mg BSH/g stomach. Prior studies had shown an increase in the urinary excretion of histamine and an increase in splenic histidine decarboxylase activity following sheep red blood cell immunization of Lewis rats. An immune response-related increase in the production and release of histamine by the stomach through an increase in histidine decarboxylase activity may be involved in the increased incidence and lethality of gastroduodenal ulceration and bleeding which occur in severe immune challenge situations such as bacterial sepsis and organ transplantation.

0373 EFFECT OF TRUNCAL, SELECTIVE AND HIGHLY SELECTIVE VAGOTOMY ON GASTRIC EMPTYING AND INTESTINAL TRANSIT OF A FOOD-BARIUM MEAL IN MAN. *(E.)* Wilkinson, A. R.; Johnston, D. (Gen. Infirm., Leeds, England). *Ann. Surg.* 178(2):190-193, 1973.

Gastric emptying of a food-barium meal was measured radiographically in 13 patients with duodenal ulcer without pyloric stenosis before operation, and in well-matched groups of patients who were in good health more than 1 yr after highly selective vagotomy (14), truncal vagotomy and pyloroplasty (12) and bilateral selective vagotomy and pyloroplasty (10). All but 2 patients were men. In each patient, the vagotomy was complete on insulin testing in the early postoperative period. The meal began to leave the stomach slightly, but not significantly earlier in patients after truncal and selective vagotomy with pyloroplasty than it did in preoperative patients or patients after highly selective vagotomy. Gastrointestinal transit was significantly increased in patients after truncal or selective vagotomy with pyloroplasty and was more rapid than in duodenal ulcer patients before operation. In patients with highly selective vagotomy, small-bowel transit was slightly faster than in duodenal ulcer patients, but was much less rapid than in patients after truncal or selective vagotomy with pyloroplasty. It is suggested that gastric emptying and small-bowel transit times are closer to normal in patients who have undergone highly selective vagotomy than in patients who have undergone truncal or selective vagotomy with pyloroplasty. There was no evidence of delayed gastric emptying after highly selective vagotomy.

0374 STIMULATION OF GASTRIC SECRETION AND GASTRIN RELEASE BY SINGLE ORAL DOSES OF CALCIUM CARBONATE IN MAN. *(E.)* Levant, J. A.; Walsh, J. H.; Isenberg, J. I. (VA Hosp., Los Angeles, Calif.). *N. Engl. J. Med.* 289(11):555-558, 1973.

In 13 fasting men (mean age 48 yr) calcium carbonate (2 g, p.o.) produced a significant increase in gastric acid secretion above basel levels for 2 hr. Of these 13 patients, 7 had active duodenal ulcers, 5 had no gastrointestinal disease, and 1 had reflux esophagitis. Serum gastrin concentration increased significantly 30 and 60 min after administration of calcium carbonate. No significant change in acid secretion or serum gastrin occurred after administration of sodium bicarbonate (2 g, p.o.). In additional tests, a significant increase in acid secretion occurred in each of 5 subjects given calcium carbonate (0.5 g, p.o.). Single oral doses of calcium carbonate thus stimulate gastric acid secretion and gastrin release in fasting subjects with and without duodenal ulcer.

0375 INFLUENCE OF LACTOSE INTOLERANCE ON THE BONES OF PATIENTS AFTER GASTRECTOMY. *(E.)* Kocian, J.; Vulterinova, M.; Bejblova, O.; Skala, I. (Postgrad. Med. Inst., Prague, Czechoslovakia). *Digestion* 8(4):324-335, 1973.

The index bone area (corticodiaphyseal index) was measured in 167 patients (91 men and 76 women, aged 31-79 yr) after partial gastrectomies (Billroth I and Billroth II) for peptic ulcer; the average time which had elapsed after surgery was about 9 yr. Values were compared with those found in 395 clinically normal subjects, aged 16-96 yr, with no history of milk intolerance. Significantly lower index bone areas were found in gastrectomized patients with lactose intolerance than in the controls. These values were significantly higher in patients without lactose intolerance than in those with lactose intolerance. The findings indicate that the width of the cortical layer in the clavicle decreases more rapidly with age in gastrectomized patients with lactose intolerance than in patients without lactose intolerance. It is concluded that lactose intolerance plays an important role in the etiology of disorders of calcium metabolism and in the development of bone degeneration.

0376 HIGH GASTRIC ACID SECRETION AFTER VAGOTOMY AND PYLOROPLASTY IN MAN - EVIDENCE FOR NONVAGAL MEDIATION. *(E.)* Moore, J. G. (Univ. Utah Coll. Med., Salt Lake City). *Am. J. Dig. Dis.* 18(8):661-669, 1973.

Twenty-four-hr basal acid collections and 4-hr insulin-stimulated gastric secretory tests were obtained in 21 male patients (aged 24-63 yr) who had vagotomy and pyloroplasty for duodenal ulcer disease from 2 to 11 yr earlier. Of these 21 patients, 11 demonstrated high basal acid secretory rates; all of these had "inadequate vagotomies" by most criteria which are based on the assumption that high secretory values represent vagal-mediated gastric secretion. However, all 9 completely studied patients in this group had maximal basal hourly secretory rates exceeding maximal insulin-stimulated hourly rates. It is argued that this observation is not compatible with the interpretation of vagal-mediated basal secretion because with an intact vagus the maximal insulin-stimulated hourly rate should exceed the maximal basal hourly rate. Regardless of the amount of basal acid secretion in the postvagotomy and pyloroplasty stomach, it is suggested that the secretion is largely nonvagal mediated, and surgery for ulcer recurrence in such patients should not center on revagotomy.

0377 EFFECTS OF ANTRECTOMY ON THE GASTRIC MUCOSA OF THE RAT. *(E.)* Capoferro, R.; Nygaard, K. (Univ. Inst. Pathol., Oslo, Norway). *Scand. J. Gastroenterol.* 31(3):347-352, 1973.

The size of the gastric mucosa and the parietal cell population were estimated in adult, male rats 100 days after antrectomy and Roux-en-Y gastrojejunostomy. Glandular mucosal volume was reduced from 411 to 229 mm^3 following complete antrectomy, to 351 mm^3 following incomplete antrectomy, and to 310 mm^3 after pentagastrin was introduced to antrectomized rats. The parietal cell density was reduced from 101 to 76 x 10^3/mm^3 when the antrectomy was complete and to 90 x 10^3/mm^3 with incomplete antrectomy. When pentagastrin (200 μg/kg) was chronically administered to antrectomized rats, the parietal cell density was increased to 153 x 10^3/mm^3. It is suggested that the withdrawal of antral gastrin is an important factor in the pathogenesis of the gastric atrophy which occurs after partial gastrectomy. No significant gastritis was found.

0378 STUDIES ON VARIOUS SULFATES AS THERAPEUTIC AGENTS FOR PEPTIC ULCER. II. SYNTHESIS OF ALUMINUM COMPLEX OF STARCH HYDROLYSATE AND ITS ANTIPEPTIC ANTIULCEROGENIC AND ANTICOAGULANT PROPERTIES. *(Jap.)* Sugiura, M.; Kitamikado, T.; Yamamoto, H.; Miyake, J. (Tokyo Coll. Pharmacol., Japan). *Folia Pharmacol.* 69(5):695-700, 1973.

0379 HETEROTOPIC GASTRIC EPITHELIUM IN THE DUODENUM AND ITS CORRELATION TO GASTRIC DISEASE AND ACID LEVEL. *(E.)* Johansen, Aa.; Hansen, O. H. (Bispebjerg Hosp., Copenhagen, Denmark). *Acta Pathol. Microbiol. Scand.* [A] 81(5):676-680, 1973.

0380 PANCREATIC ENZYME ACTIVITY AFTER GASTRIC RESECTION. *(Sl.)* Beno, I.; Kopec, Z.; Ovecka, M. (Res. Inst. Human Nutr., Bratislava, Czechoslovakia). *Vnitr. Lek.* 18(10):939-943, 1972.

0381 THE EFFECT OF POLDINE (NACTON) ON GASTRIC SECRETION IN THE TREATMENT OF PEPTIC ULCER. *(Cz.)* Kopriva, V.; Svac, J.; Bilkovic, R. (Regional Inst. Public Health, Banska Bystrice, Czechoslovakia). *Cesk. Gastroent. Vyz.* 27(4):242-245, 1973.

0382 PEPTIC ULCER AND BRONCHIAL CARCINOMA. *(Ger.)* Salzer, G. M.; Schennach, W. (Surg. Clin., Univ. Innsbruck, Austria). *Dtsch. Med. Wochenschr.* 98(43):2001-2003, 1973.

0383 HETEROTOPY OF GASTRIC MUCOSA IN THE DUODENUM. *(Dut.)* Hoedemaeker, Ph. J. (Pathol. Anat. Lab., Free Univ., Groningen, Netherlands). *Tijdschr. Gastroenterol.* 16(1):12-22, 1972.

0384 CHARACTERISTICS OF GASTRIC SECRETION IN PATIENTS WITH PEPTIC ULCER. *(Rus.)* Gadzhev, A. S.; Anan'ev, V. G.; Spivak, V. P.; Garshin, K. A. (Dnepropetrovsk Sci. Res. Inst. Gastroenterol., USSR). *Vrach. Delo* (10):11-13, 1973.

0385 VAGOTOMY AND ANTROPYLORECTOMY IN THE SURGICAL TREATMENT OF PEPTIC ULCER. *(E.)* Langer, L. (Fac. Gen. Med., Charles Univ., Prague, Czechoslovakia). *Acta Univ. Carol.* [*Med.*] 50:5-99, 1972.

0386 HIGHLY SELECTIVE VAGOTOMY WITHOUT A DRAINAGE PROCEDURE IN THE TREATMENT OF HAEMORRHAGE, PERFORATION, AND PYLORIC STENOSIS DUE TO PEPTIC ULCER. *(E.)* Johnston, D.; Lyndon, P. J.; Smith, R. B.; Humphrey, C. S. (Univ. Dept. Surg., Leeds, England). *Br. J. Surg.* 60(10):790-797, 1973.

0387 USE OF PROTEIN HYDROLYZATES AND ANABOLIC STEROIDS IN THE COMBINED TREATMENT OF PATIENTS WITH ULCERS. *(Rus.)* Spivak, A. M. (Kiev Med. Inst., USSR). *Vrach. Delo* (10):3-7, 1973.

0388 STATE OF THE CARBOHYDRATE METABOLISM IN PATIENTS WITH GASTRIC AND DUODENAL ULCERS. *(Rus.)* Stepashkina, K. I.; Podlesnaia, V. A. (Dnepropetrovsk Med. Inst., USSR). *Vrach. Delo* (10):1-3, 1973.

0389 CONTENT OF PROTEIN FRACTIONS AND SERUM FREE AMINO ACIDS IN PATIENTS WITH COMPLICATED ULCER DISEASE. *(Rus.)* Kovalev, M. M.; Teplyi, V. K. (Kiev Med. Inst., USSR). *Vrach. Delo* (8):42-48, 1973.

0390 THE DISCRIMINATORY ABILITY OF GASTRIC ACID SECRETION TESTS IN THE DIAGNOSIS OF RECURRENCE AFTER TRUNCAL VAGOTOMY AND DRAINAGE FOR DUODENAL ULCER. *(E.)* Kronborg, O. (Bispebjerg Hosp., Copenhagen, Denmark). *Scand. J. Gastroent.* 8(6):483-489, 1973.

0391 ACUTE "STRESS" ULCERS OF THE STOMACH: A REVIEW. *(E.)* Wangensteen, S. L.; Golden, G. T. (Univ. Virginia Med. Ctr., Charlottesville). *Am. Surg.* 39(10):562-567, 1973.

0392 NICOTINIC ACID AND RESTRAINT INDUCED ULCERS. *(E.)* Lindenbaum, E. S.; Diamond, B.; Yaryura-Tobias, J. A. (Cen. Islip State Hosp., New York). *Acta Physiol. Lat. Am.* 23(4):288-292, 1973.

0393 A CLINICAL EVALUATION OF THE APOMORPHINE TEST. *(E.)* Axelsson, C.; Mortensen, E.; Schwartz, H. (Comm. Hosp., Copenhagen, Denmark). *Scand. J. Gastroent.* 8(8):751-754, 1973.

0394 THE SENSITIVITY TO 5-HYDROXYTRYPTAMINE OF VARIOUS PARTS OF THE GASTRO-INTESTINAL TRACT OF THE RATS WITH EXPERIMENTAL GASTRIC ULCERS. *(E.)* Lastowski, Z.; Sowa, J.; Kleinrok, Z. (Med. Acad., Lublin, Poland). *Pol. J. Pharmacol. Pharm.* 25(5):435-440, 1973.

0395 AFFERENT- AND BLIND-LOOP SYNDROME IN GASTRIC SURGERY. *(Ger.)* Wedell, J.; Peters, H. (R.W.T.H. Aachen Med. Fac., Germany). *Langenbecks Arch. Chir.* 333(3):191-209, 1973.

0396 HISTOCHEMICAL STUDY OF BIOGENIC MONOAMINES IN GASTRIC WALL DURING EXPERIMENTAL ULCER IN RATS. *(E.)* Gombos, A.; Stopek, D. (Safarik Univ. Fac. Med., Kosice, Czechoslovakia). *Folia Morphol. (Praha)* 21(4):359-360, 1973.

0397 THE IMPORTANCE OF RED CELL B_{12} AND FOLATE LEVELS AFTER PARTIAL GASTRECTOMY. *(E.)* Mahmud, K.; Kaplan, M. E.; Ripley, D.; Swaim, W. R.; Doscherholmen, A. (VA Hosp., Minneapolis, Minn.). *Am. J. Clin. Nutr.* 27(1):51-54, 1974.

0398 STUDIES ON VARIOUS SACCHARID SULFATES AS THERAPEUTIC AGENTS FOR PEPTIC ULCER. I. ANTI-ULCEROGENIC AND ANTICOAGULANT PROPERTIES OF SULFATES OF STARCH HYDROLYSATE AND GELFILTRATED STARCH HYDROLYSATE. *(Jap.)* Sugiura, M.; Sugiura, S.; Yamamoto, H. (Tokyo Coll. Pharm., Japan). *Folia Pharmacol.* 69(5):689-693, 1973.

0399 CLINICAL EVALUATION OF PHARMACOTHERAPY FOR PEPTIC ULCER WITH ANTIPEPSIN AGENTS BY DOUBLE BLIND TECHNIQUE - MULTICENTER CLINICAL STUDY. *(E.)* Yamagata, S.; Ishimori, A.; Sato, H.; Okabe, H.; Ishihara, K.; Yugawa, N.; Masuda, M.; Kishikawa, M.; Sakita, T.; Ashizawa, S.; Tsuneoka, K.; Kaito, I.; Wada, T.; Namiki, M. (Tohoku Univ. Sch. Med., Sendai, Japan). *Tohoku J. Exp. Med.* 110(4):377-404, 1973.

0400 FUNCTIONAL MORPHOLOGY OF THE LIVER IN ULCERATIVE DISEASE. *(Rus.)* Drozd, T. N.; Leonenkova, Z. F.; Tikhonova, G. N. (I. M. Sechenov 1st Moscow Med. Inst., USSR). *Arkh. Patol.* 35(6):35-42, 1973.

0401 ANTIULCER ACTIVITY IN THE SERIES OF 5-SUBSTITUTED FURAN-2-CARBOXYLIC, PARALYKOXY-BENZOIC ACIDS AND BENZOFURAN POLYETHYLENEDIAMIDES. *(Rus.)* Mirzoyan, S. A.; Nazaretyan, R. A. (no affil.). *Farmakol. Toksikol.* 36(3):306-310, 1973.

0402 ASCORBIC ACID IN CHRONIC ULCER OF THE DUODENUM AND STOMACH. *(Pol.)* Nadulska. D. (Inst. Intern. Med., Lublin, Poland). *Pol. Tyg. Lek.* 27(39):1514-1516, 1972.

See also, 0114, 0279, 0292, 0299, 0305, 0308, 0312, 0350, 0360, 0367, 0368.

SMALL INTESTINE

0403 INTESTINAL BYPASS OPERATIONS FOR OBESITY. *(E.)* Baber, Jr., J. C.; Hayden, W. F.; Thompson, B. W. (Univ. Arkansas Med. Ctr., Little Rock). *Am. J. Surg.* 126(6):769-772, 1973.

Ninety jeunoileal bypasses were performed on 86 patients (66 women and 20 men, aged 17-46 yr) to control morbid obesity. The 15 and 10 inch anastomosis was well tolerated, but only 2 of 10 patients are within the normal weight range after 4-10 year. The 14 and 4 inch bypass produced an average weight loss of 100 pounds in 58 patients but resulted in 2 deaths due to progressive liver disease and in 26 of the 29 nonfatal complications in this series. These nonfatal complications included electrolyte imbalance (8), acute cholecystitis (6), incisional hernia (3), wound infection (2), renal calculi (3), evisceration (1), intestinal obstruction (1), intussusception (1), and stress ulcer (1). The 15 and 5 inch jejunoileal end to side anastomosis appears to give better results. Although the follow-up period has been only 3-4 months, complications have been few and the 18 patients have lost 28-86 pounds.

0404 CONCOMITANT OCCURRENCE OF NEUROFIBROMATOSIS AND CARCINOID OF THE INTESTINE. *(E.)* Arnesio, B.; Idvall, I.; Ihse, I.; Telenius, M.; Tylen, U. (Univ. Hosp., Lund, Sweden). *Scand. J. Gastroenterol.* 8(7):637-643, 1973.

Von Recklinghausen's neurofibromatosis with multiple intestinal and cutaneous involvement is described in a 70-yr-old woman. One of the neurogenic tumors with ganglionic cells apparently became transformed into a carcinoid composed of enterochromaffin cells. No distinct border was observed between the carcinoid and the underlying ganglio-neurofibroma. Nests of carcinoid tumor cells were intermingled with the neurogenic tumor tissue. A concomitant rise in plasma catecholamines and immunoreactive serum parathyroid hormone levels suggests the possibility of a multiple endocrine adenomatosis syndrome. The findings in this case support the theory that the enterochromaffine cell system of the gastrointestinal tract and the cells involved in uptake and decarboxylation of amines and amine precursors have a common origin within the neural crest.

0405 CHRONIC IDIOPATHIC INTESTINAL PSEUDO-OBSTRUCTION WITH MALABSORPTION, A SCLERODERMA-LIKE DISORDER. *(E.)* Lukie, B. E.; Sanders, M. G. (Toronto Western Hosp., Canada). *Can. Med. Assoc. J.* 15(2):1222-1227, 1973.

Intestinal pseudo-obstruction occurred in a 76-yr-old man who presented with a 6-yr history of vomiting and abdominal pain and a 1 1/2-yr history of diarrhea. Investigation demonstrated aperistalsis of the lower esophagus and an unresponsive atonic small intestine. Marked malabsorption was present and appeared to be caused by intestinal bacteria overgrowth resulting from the hypomotility. No definite abnormality was found in the autonomic nervous system. Although this disorder is markedly similar to scleroderma involving the gastrointestinal tract, only minimal fibrosis of the bowel musculature was evident at autopsy, and the neural components appeared to be intact. These findings suggest that the basic disorder may be one of smooth muscle dysfunction. Other known causes of pseudo-obstruction, including intestinal amyloidosis and gluten-sensitive enteropathy, could not be demonstrated.

0406 LIPOMATOSIS OF THE ILEOCECAL VALVE: AN UNCOMMON CAUSE OF MELENA. *(E.)* Hovelius, L. (Gavle Hosp. Sch. Med., Sweden). *Acta Chir. Scand.* 139(7):673-676, 1973.

0407 ILEOCOLIC INTUSSUSCEPTION IN AN INFANT CAUSED BY ILEAL DUPLICATION CYST. *(E.)* Peterson, H.; Grynsztajn, A. (Central Hosp., Boras, Sweden). *Acta Chir. Scand.* 139(6):582-584, 1973.

0408 JEJUNO-ILEOSTOMY IN THE TREATMENT OF OBESITY. *(E.)* Schwartz, H.; Jensen, H. (Munic. Hosp., Copenhagen, Denmark). *Acta Chir. Scand.* 139(6):551-556, 1973.

0409 SIX CASES OF NECROSING ENTERITIS. *(Fr.)* Carabalona, P.; Vernhet, J.; Bonnel, F.;

Barthelemy, M. (no affil.). *Chirurgie* 99(5):316-320, 1973.

0410 ADENOCARCINOMA OF THE AMPULLA OF VATER IN THE PROXIMAL JEJUNUM. *(Fl.)* Kerremans, R.; Baert, A.; Broeckx, J. (St. Rafael Hosp., Louvain, Belgium). *Tijdschr. Gastroenterol.* 16(1): 7-11, 1973.

0411 GASTRIC LIPOLYSIS OF HUMAN MILK LIPIDS IN INFANTS WITH PYLORIC STENOSIS. *(E.)* Olivecrona, T.; Billstrom, A.; Fredrikzon, B.; Johnson, O.; Samuelson, G. (Dept. Pediatr. Univ. Umea, Sweden). *Acta Paediatr. Scand.* 62(5):520-522, 1973.

0412 TUMOR METASTASES TO THE SMALL BOWEL FROM EXTRA-ABDOMINAL SITES. *(E.)* Richie, R. E.; Reynolds, V. H.; Sawyers, J. L. (Vanderbilt Univ. Hosp., Nashville, Tenn.). *South. Med. J.* 66(12): 1383-1387, 1973.

0413 DIAGNOSIS AND MANAGEMENT OF AN ARTERIOVENOUS FISTULA OF PANCREAS AND DUODENUM. *(E.)* Grannis, F. W.; Foulk, W. T.; Miller, W. E.; Payne, W. S. (Mayo Sch. Med., Univ. Minnesota, Rochester). *Mayo Clin. Proc.* 48(11):780-782, 1973.

0414 OXALURIA IN PATIENTS WITH ILEAL DYSFUNCTION. *(E.)* Anonymous (no affil.). *Nutr. Rev.* 31(10):308-309, 1973.

0415 THE "PSEUDOTUMOR SIGN" IN STRANGULATION ILEUS OF THE SMALL INTESTINE OF ADULTS AND ITS DIFFERENTIAL DIAGNOSIS. *(Ger.)* Heidenblut, A.; Fischer, F. (Oscar Ziethen State Hosp., Berlin, Germany). *Rad. Diag.* 14(3):329-340, 1973.

0416 INTRINSIC DUODENAL LESIONS: CLINICAL FEATURES. *(E.)* Reid, I. S. (Roy. Alexandra Hosp. Child., Camperdown, Australia). *Aust. N.Z. J. Surg.* 43(2):158-160, 1973.

0417 HEMORRHAGIC DUODENITIS: A SIGNIFICANT CAUSE OF GASTROINTESTINAL BLEEDING. *(E.)* Gelzayd, E. A.; Gelfand, D. W. (Providence Hosp., Southfield, Mich.). *Gastrointest. Endosc.* 20(2): 59-60, 1973.

0418 DUODENOSCOPIC REMOVAL OF A BRUNNER'S GLAND ADENOMA. *(E.)* Alper, E. I.; Haubrich, W. S. (Scripps Clin. Res. Found., La Jolla, Calif.). *Gastrointest. Endosc.* 20(2):73, 1973.

0419 CONGENITAL DUODENAL ATRESIA. *(E.)* Kraeger, R. R.; Gromoljez, P.; Lewis, J. E. (Cardinal Glennon Mem. Hosp. Child., St. Louis). *Am. J. Surg.* 126(6):762-764, 1973.

0420 THE CONTINENT ILEOSTOMY. *(E.)* Cameron, A. (Middlesex Hosp., London, England). *Br. J. Surg.* 60(10):785-790, 1973.

0421 SURGICAL TREATMENT OF ILEOCECAL TUBERCULOSIS. *(E.)* Singh, H. N.; Roy, S. K.; Vaidya, M. P. (Inst. Med. Sci., Banaras Hindu Univ., Varanasi, India). *Am. Surg.* 39(12):706-709, 1973.

0422 INTESTINAL OBSTRUCTION DUE TO A PERSISTENT VITELLINE ARTERY. *(E.)* Myers, N. A.; Rubin, S. (Roy. Child. Hosp., Parkville, Australia). *Aust. N.Z. Surg.* 43(2):161-162, 1973.

0423 PRESENT PROBLEMS IN CARCINOID TUMOUR OF THE SMALL INTESTINE, REPORT OF TWO PERSONAL CASES. *(Fr.)* Debray, J.; Christol, R.; Cloarec, M.; Cheymol, G.; Krulik, M.; Maechel, H. (Saint-Antoine Hosp., Paris, France). *Ann. Med. Interne (Paris)* 124(10):675-685, 1973.

0424 INTUSSUSCEPTION AS A CAUSE OF ACUTE INTESTINAL OBSTRUCTION IN ADULTS. A REPORT ON THREE CASES. *(E.)* Cedermark, B.; Freedman, D.; Lindholmer, B. (St. Erik's Hosp., Stockholm, Sweden). *Acta Chir. Scand.* 139(7):671-672, 1973.

0425 VOLVULUS OF THE SMALL INTESTINE IN INDIA. *(E.)* Gulati, S. M.; Grover, N. K.; Tagore, N. K.; Taneja, O. P. (Maulana Azad Med. Coll., New Delhi, India). *Am. J. Surg.* 126(4):661-664, 1973.

0426 DUODENAL VARICES SECONDARY TO INFERIOR VENA CAVA OBSTRUCTION. *(E.)* Greenspan, A.; Bryk, D. (Jewish Hosp., Brooklyn, N.Y.). *Am. J. Dig. Dis.* 18(11):983-986, 1973.

0427 EXCLUSION OF THE SMALL INTESTINE IN THE TREATMENT OF EXTREME OBESITY. *(Ger.)* Husemann, B. (Surg. Clin., Univ. Erlangen-Nurnberg, Germany). *Dtsch. Med. Wochenschr.* 98(49):2343-2347, 1973.

0428 INTESTINAL DUPLICATION. A REPORT OF TWO CASES. *(E.)* Wilkinson, D. J.; Chir, B.; Wilkinson, K. W.; Hajdu, N. (St. George's Hosp., London, England). *Br. J. Radiol.* 46(552):1070-1072, 1973.

0429 THE PERFORATED DIVERTICULUM OF THE DUODENUM. *(E.)* Peutz, W. H. V.; Sannen, L. J. M. J.; Sing, L. H. (Maria Hosp., Tilburg, Netherlands). *Arch. Chir. Neerl.* 25(3):313-318, 1973.

0430 UPPER GASTROINTESTINAL BLEEDING ASSOCIATED WITH CONGENITAL DUODENAL STENOSIS AND DOWN'S SYNDROME. *(E.)* Sachs, B. F.; Feldman, W. (Fac. Med., McMaster Univ., Ontario, Canada). *Clin. Pediatr.* 12(12):21A-25A, 1973.

0431 SMALL BOWEL INJURY FOLLOWING RADIATION THERAPY FOR CERVICAL CANCER. *(E.)* Nagell, J. R., Jr.; Maruyama, Y.; Parker, J. C.; Dalton, W. L. (Univ. Kentucky Med. Ctr., Lexington). *Am. J. Obstet. Gynecol.* 118(2):163-167, 1974.

0432 HUMAN ENTEROKINASE. *(E.)* Rutgeerts, L.; Tytgat, G.; Eggermont, E. (Catholic Univ. Louvain, Belgium). *Tijdschf. Gastroenterol.* 15(6): 379-384, 1973.

0433 MULTIPLE DIVERTICULA OF THE SMALL INTESTINE. *(Sp.)* Parreno Urena, J. L. (no affil.). *Rev. Esp. Enferm. Apar. Dig.* 39(1):87-90, 1973.

0434 CYSTIC LYMPHANGIOMA OF THE SMALL INTESTINE. *(Sp.)* Quemada Sisniega; Esquerdo Jimenez; Manueco Santurtum. (San Jose Surg. Sanitorium, Valladolid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 39(3):337-344, 1973.

0435 PATHOLOGY OF MECKEL'S DIVERTICULUM. *(Sp.)* Sancho Rodriguez-Fornos, S. (Provincial Hosp., Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 39:527-546, 1973.

0436 HYPERTROPHY OF BRUNNER'S GLANDS AND BENIGN TUMORS OF THE DUODENUM. *(Sp.)* Andreu Oller, L.; Sala Cladera, E. (Santa Cruz and San Pablo Hosp., Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 40(6):597-614, 1973.

0437 PRIMARY MELANOSARCOMA OF THE SMALL INTESTINE: DESCRIPTION OF ONE CASE. *(Sp.)* Orozco, H. (Div. Surg., Natl. Inst. Nutr., Mexico City, Mexico). *Rev. Invest. Clin.* 24(3):267-272, 1972.

0438 PROLONGED SURVIVAL AFTER COMPLETE SMALL BOWEL RESECTION USING INTRAVENOUS ALIMENTATION AT HOME. *(E.)* Langer, B.; Michattie, J. D.; Zohrab, W. J.; Jeejeebhoy, K. N. (Toronto Gen. Hosp., Canada). *J. Surg. Res.* 15(3):226-233, 1973.

0439 LATE COMPLICATIONS FOLLOWING SIDE-TO-SIDE ANASTOMOSES WITH SPECIAL REFERENCE TO THE BLIND-LOOP SYNDROME. *(Ger.)* Lennert, K. A.; Lucic, J. (Surg. Dept., Wolfgang Goethe Univ., Frankfurt, Germany). *Langenbecks Arch. Chir.* 333:81-90, 1973.

0440 STENOSIS AND ATRESIA OF THE SMALL INTESTINE (44 CASES). *(Fr.)* Chavrier, Y.; Campo-Paysaa, A.; Korkmaz, G.; Mollard, P. (Debrousse Hosp., Lyon, France). *Lyon Chir.* 69(3): 171-175, 1973.

0441 VILLOUS ADENOMA IN A BLIND DUODENAL LOOP. *(E.)* Jones, P. E.; Clegg, J. F. (Manchester Northern Hosp., England). *Postgrad. Med. J.* 49(575):656-657, 1973.

0442 ACUTE ABDOMEN CAUSED BY BLEEDING FROM A CYSTIC LYMPHANGIOMA OF THE MESENTERY. *(Sp.)* Sarrias-Batista, A. (Sacred Heart Hosp., Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 38(4):487-496, 1972.

0443 PYLORIC HYPERTROPHY IN THE ADULT. *(Sp.)* Badosa Gallart, J. (Sacred Heart Hosp., Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 39(1):1-26, 1973.

0444 MECKEL'S DIVERTICULUM. *(E.)* Christie, A. (Vanderbilt Univ. Sch. Med., Nashville, Tenn.). *Am. J. Dis. Child.* 124(5):700, 1972.

0445 ENTERITIS DUE TO "RELATED VIBRIO" IN CHILDREN. *(E.)* Cadranel, S.; Rodesch, P.; Butzler, J. P.; Dekeyser, P. (Hosp. St. Pierre, Brussels, Belgium). *Am. J. Dis. Child.* 126(2):152-158, 1973.

See also, 0193, 0266, 0277, 0278, 0320, 0513, 0525, 0528, 0654, 0664, 0676, 0690, 0706, 0722, 0795.

Malabsorption

0446 HISTOCHEMICAL STUDIES OF THE MUCOSA OF THE SMALL INTESTINE IN IMPAIRED ABSORPTION SYNDROMES IN CHILDREN. *(E.)* Jonek, J.; Hager-Malecka, B.; Pawelek-Krombholz, D.; Sonta-Jakimczyk, D. (Inst. Biol. Morphol., Katowice, Poland). *Fol. Histochem. Cytochem.* 11(1):33-40, 1973.

The localization of acid and alkaline phosphatases, adenosine triphosphatase, and gamma-glutamyl transpeptidase activities was studied in mucosal biopsies from the small intestine of healthy children and in 14 children with malabsorption. In the controls these enzymes were most active in enterocytes in the apical parts of the villi. In children with malabsorption, the reaction for alkaline phosphatase and ATPase occurred in the so-called third zone of activity of the villus; this probably was connected with damage to the cell organelles with ensuing impairment of absorption and intracellular digestion processes. Gamma-glutamyl transpeptidase was slightly less active in sick than in healthy children. This decrease, however, was independent of the degree of injury to the cells of the absorption surface. These results suggest that morphological elements of the cell become damaged in malabsorption. This is associated with a decrease in the activities of several enzymes indispensable for most metabolic processes, including the absorption and digestion of food. It also seems likely that, as the damaging factors recede, the absorption surface regains its normal state as evidenced by normal histochemical reactions.

0447 INTESTINAL PERFUSION STUDIES IN TROPICAL SPRUE. I. TRANSPORT OF WATER, ELECTROLYTES, AND *d*-XYLOSE. *(E.)* Corcino, J. J.; Maldonado, M.; Klipstein, F. A. (Trop. Malabsorption Unit, Univ. Puerto Rico, San Juan). *Gastroenterology* 65(2):192-198, 1973.

Segmental jejunal perfusion studies were performed to assess water, sodium, chloride and *d*-xylose transport in 10 carefully selected patients (aged 15-67 yr) with untreated tropical sprue who had diarrhea for at least 1 month prior to and at the time of perfusion, and in 8 control subjects. All of the patients with tropical sprue were in a net secretory state in regards to water, sodium, and chloride as compared with control subjects. Of the 10 patients, 6 had steatorrhea and 5 had a low serum albumin Vitamin B_{12} absorption was impaired in all patients. *d*-Xylose absorption was lower in patients with tropical sprue (4.8 mg/hr/cm) than in controls (14.1 mg/hr/cm). By analysis of combined data from controls and patients with tropical sprue, a significant correlation was demonstrated between the absorption of xylose as measured by the segmental perfusion technique and 5-hr urinary xylose excretion as well as the peak serum xylose level obtained with a standard xylose absorption test utilizing a 25-g dose of xylose. The net secretory state for water, sodium, and chloride observed in patients with tropical sprue may be relevant to the pathogenesis of the diarrhea seen in this syndrome. Contamination with coliform bacteria occurs in tropical sprue, and certain of these organisms have been shown to produce enterotoxins. Whether these enterotoxins account fully for the derangements in water and electrolye transport found in patients with tropical sprue remains undetermined.

0448 ACQUIRED HYPEROXALURIA WITH REGIONAL ENTERITIS AFTER ILEAL RESECTION. ROLE OF DIETARY OXALATE. *(E.)* Stauffer, J. Q.; Humphreys, M. H.; Weir, G. J. (Naval Hosp., Great Lakes, Ill.). *Ann. Intern. Med.* 79(3):383-391, 1973.

Urinary oxalate excretion was measured in 11 patients (9 males and 2 females, aged 21-73 yr) with inflammatory bowel disease involving the terminal ileum. Of the 11, 6 patients had minimal or no resection of terminal ileum and 6 other patients had resections greater than 30 cm; 1 patient was studied before and after resection. Basal urinary oxalate excretion was normal in those with minimal or no resection, but was significantly elevated in the other group. Treatment with oral cholestyramine, caused urinary oxalate excretion to fall promptly to within the normal range in the group with extensive resection, but remained unchanged in the other group. Of 6 patients 5 had severe, explosive, watery diarrhea, which was dramatically reversed by cholestyramine. Hyperoxaluria in 2 patients was reversed when oxalate was removed from the diet. *In vitro* studies showed that cholestyramine binds oxalic acid. These data suggest that the mechanism of acquired hyperoxaluria in patients with ileal resection is related to enhanced absorption of dietary oxalate.

0449 LACTOSE-FREE MEDIUM-CHAIN TRIGLYCERIDE FORMULAS IN SEVERE MALNUTRITION. *(E.)* Graham, G. G.; Baertl, J. M.; Cordano, A.; Morales, E. (Sch. Med., Johns Hopkins Univ., Baltimore, Md.). *Am. J. Dis. Child.* 126(3):330-335, 1973.

A lactose-free medium chain triglyceride casein formula (Lactose-Free Portagen) was used in the successful management of 4 boys (aged 23.3-38.8 months) with kwashiorkor and 3 infants (2 males and 1 female, aged 5.1-16.5 months) with persistent hypoalbuminemia, 2 of whom had associated infections. A second formula (Pregestimil), based on a casein hydrolysate and medium-chain triglycerides with dextrose as a major carbohydrate, was used successfully in 5 infants with severe marasmus, 1 with kwashiorkor, and 5 with marasmus, severe diarrhea, and infection. Since about half of the children with Kwashiorkor had decreased lactose tolerance, the absence of lactose was of definite benefit. It is suggested that the dextrose benefited some of the sickest infants, but this was not proved. No evidence of sucrose intolerance or poor digestion of protein was found.

0450 CYSTIC FIBROSIS AND COELIAC DISEASE: COEXISTENCE IN TWO CHILDREN. *(E.)* Good-child, M. C.; Nelson, R.; Anderson, C. M. (Inst. Child Health, Univ. Birmingham, England). *Arch. Dis. Child.* 48(9):684-691, 1973.

Cystic fibrosis was diagnosed in 2 unrelated female infants aged 14 weeks and 10 months, resp., who were found subsequently to suffer from celiac disease as well. Both children are responding well to dietary gluten withdrawal and to conventional treatment for cystic fibrosis. It is suggested that cystic fibrosis, particularly in a child with a high risk HL-A phenotype, may predispose to the development of celiac disease. Therefore, jejunal biopsy may be a useful investigation in the occasional child with cystic fibrosis who presents with unusual features, or who fails to thrive as well as expected on regular therapeutic measures.

0451 NEUROLOGIC MANIFESTATIONS IN TROPICAL SPRUE. A CLINICAL AND ELECTRODIAGNOSTIC STUDY. *(E.)* Iyer, G. V.; Taori, G. M.; Kapadia, C. R.; Mathan, V. I.; Baker, S. J. (Christian Med. Coll. Hosp., Vellore, India). *Neurology* 23(9):959-966, 1973.

Malabsorption syndrome caused hospitalization of 24 patients (14 males and 10 females, aged 10-51 yr), all diagnosed as having tropical sprue. Fatigue and weakness were frequent complaints. Of the 15, 8 had obvious muscle wasting, 1 had tetany. Paresthesias were present in 6 patients. Mental changes of bradyphrenia, defective recent memory, and emotional lability were noted in 3 patients. Night blindness occurred in 5. Although the means of the distal latencies for the median, ulnar, and lateral popliteal nerves were slightly higher in sprue patients than in controls, the difference was significant only for the ulnar nerve. Peripheral neuropathy was detected in 8 patients. Dysrhythmia of 4 to 5 cps mainly in the frontal and temporal regions bilaterally was noted in 5 of 21 patients so tested. On needle electromyography, 10 patients showed a myopathic pattern. All these patients, except 1 who suffered from acute combined degeneration, responded well to treatment.

0452 DEMONSTRATION OF AN INACTIVE ENZYME ANTIGEN IN SUCRASE-ISOMALTASE DEFICIENCY. *(E.)* Dubs, R.; Steinmann, B.; Gitzelmann, R. (Childrens Hosp., Zurich, Switzerland). *Helv. Paediatr. Acta* 28(3):187-198, 1973.

A specific antibody against human sucrase-isomaltase was obtained from guinea pigs and used to identify the enzyme in epithelial cells of the small intestinal mucosa by indirect fluorescent staining. Human sucrase-isomaltase was thus visualized for the first time. The investigation was conducted using 6 children with sucrose intolerance due to hereditary sucrase-isomaltase deficiency. In all 6, immunofluorescence demonstrated the presence of the enzyme. The intensity of fluorescence varied markedly between patients and between areas of observation. In spite of fluorescence, lack of enzyme activity was complete in some patients. Thus, it is suggested that the structural alteration of the enzyme was such that complete inactivation resulted. Only partial correlation was noted between the intensity of fluorescence and the residual enzyme activity. Genetic heterogeneity was suspected in this small sample of sucrase-isomaltase deficient children.

0453 SERUM VITAMIN E LEVELS IN CHILDREN AND ADULTS WITH TROPICAL SPRUE IN PUERTO RICO. *(E.)* Ramirez, I.; Santini, R.; Corcino, J.; Santiago, P. J. (Univ. Puerto Rico Sch. Med., San Juan). *Am. J. Clin. Nutr.* 26(10):1045, 1973.

0454 PRIMARY DEFICIENCY OF INTESTINAL TREHALASE. *(Cz.)* Madzarovova-Nohejlova, J. (Med. Fac., Charles Univ., Plzen, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 27(6):375-380, 1973.

0455 EFFECT OF 25-HYDROXYCHOLECALCIFEROL (25-HCC) ON INTESTINAL ABSORPTION OF ^{47}Ca IN FOUR CASES OF IATROGENIC CUSHING'S SYNDROME. *(E.)* Caniggia, A.; Gennari, C. (Inst. Med. Semeiotics, Univ. Siena, Italy). *Helv. Med. Acta* 37(4):221-225, 1973.

0456 LACTOSE MALABSORPTION IN ETHIOPIAN CHILDREN. *(E.)* Habte, D.; Sterky, G.; Hjalmarsson, B. (Ethio-Swedish Pediatr. Clin., Addis Ababa, Ethiopia). *Acta Paediatr. Scand.* 62(6):649-654, 1973.

0457 FAMILIAL SELECTIVE MALABSORPTION OF VITAMIN B_{12}. *(E.)* Bell, M.; Harries, J. T.; Wolff, O. H.; Dawson, A. M.; Waters, A. H. (Hosp. Sick Child., London, England). *Arch. Dis. Child.* 48(11):896-900, 1973.

0458 LACTOSE ABSORPTION KINETICS IN ZAMBIAN AFRICAN SUBJECTS. *(E.)* Cook, G. C. Asp, N. -G.; Dahlqvist, A. (Dept. Med., Univ. Zambia, Lusaka). *Br. J. Nutr.* 30(3):519-527, 1973.

0459 INFANTILE MALNUTRITION AND MALABSORPTION. *(E.)* Anonymous (no affil.). *Nutr. Rev.* 31(10):321-323, 1973.

0460 GASTROINTESTINAL ALLERGY. *(E.)* Clancy, R.; Chiavaro, H.; Jacobs, J. (Dept. Med. Pediatr., McMaster Univ., Hamilton, Canada). *Paediatrician* 1(6):358-366, 1973.

0461 GLUCOSE-GALACTOSE MALABSORPTION IN AN ADULT: PERFUSION STUDIES OF SUGAR, ELECTROLYTE, AND WATER TRANSPORT. *(E.)* Phillips, S. F.; McGill, C. B. (Mayo Clin., Rochester, Minn.). *Am. J. Dig. Dis.* 18(12):1017-1024, 1973.

0462 EVIDENCE FOR INTESTINAL MALABSORPTION OF IODINE IN PROTEIN-CALORIE MALNUTRITION. *(E.)* Ingenbleek, Y.; Beckers, C. (Clin. Nutrition Child., Univ. Dakar, Senegal). *Am. J. Clin. Nutr.* 26(12):1323-1330, 1973.

0463 MILK INTOLERANCE AFTER GASTRECTOMY. *(E.)* Pirk, F.; Skala, I.; Vulterinova, M. (Inst. Clin. Exp. Med., Prague, Czechoslovakia). *Digestion* 9(2):130-137, 1973.

0464 PERNICIOUS ANEMIA WITH PERSISTENT MALABSORPTION OF VITAMIN B_{12} IN A CHILD. *(E.)* Maurer, H. S.; Choi, H. S.; Forman, E. N.; Honig, G. R. (Dept. Pediatr., Univ. Illinois, Chicago). *J. Pediatr.* 83(5):832-835, 1973.

0465 COELIAC PRIMARY AMENORRHOEA. *(E.)* Gent, A. E. (St. Thomas' Hosp., London, England). *Digestion* 8(6):509-512, 1973.

0466 VITAMIN B_{12} AND TROPICAL SPRUE. *(E.)* Baker, S. J. (Christian Med. Coll. Hosp., Tamilnadu, India). *Br. J. Haematol.* (Suppl. 23):135-146, 1972.

0467 STRUCTURAL CHANGES AND CHANGES IN ENZYMATIC ACTIVITY OF THE INTESTINAL MUCOSA IN ADULTS TREATED DURING CHILDHOOD FOR COELIAC DISEASE. *(Cz.)* Kojecky, Z.; Kodousek, R.; Malinsky, J. (Med. Fac., Palacky Univ., Okomouc, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 27(4):193-197, 1973.

0468 DIET THERAPY FOR PATIENTS WITH MALABSORPTION SYNDROME IN SPAS. *(E.)* Skapik, M.; Skala, I.; Vulterinova, M. (Skapik, M. (Res. Inst. Balneol., Marianske Lazne, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 27(2):74-81, 1973.

0469 HEREDITARY DEFECTS OF FRUCTOSE AND GALACTOSE METABOLISM. *(Ger.)* Gitzelmann, R.; Baerlocher, K.; Prader, A. (Child. Clin., Univ. Zurich, Switzerland). *Monatsschr. Kinderheilkd.* 121(5):174-180, 1973.

0470 FOLATE IN TROPICAL SPRUE. *(E.)* Klipstein, F. A. (Univ. Hosp., San Juan, Puerto Rico). *Br. J. Haematol.* 23(suppl.):119-133, 1972.

See also, 0256, 0364, 0375, 0395, 0905, 0806.

LARGE INTESTINE

0471 THE EFFECT OF INTESTINAL PREPARATION ON FLUID AND ELECTROLYTE BALANCE. *(E.)* Irvin, T. T.; Hayter, C. J.; Warren, K. E.; Goligher, J. C. (Gen. Infirm., Leeds, England). *Br. J. Surg.* 60(6):484-488, 1973.

Measurements were made in 25 patients (16 males and 9 females, aged 59-83 yr) undergoing mechanical bowel preparation for surgery. At surgery, carcinoma of the colon or rectum was diagnosed in 12 patients, Crohn's disease in 1, and diverticular disease of the sigmoid in 12. Blood-volume measurements remained within normal limits after bowel preparation, and in 5 patients bowel preparation produced no change in total body exchangeable sodium, extracellular fluid volume, and plasma volume. Fluid and electrolyte balance studies in 11 cases showed that renal conservation of sodium occurred in the 24 hr preceding surgery, probably due to diminished dietary intake. Circulatory instability after the induction of anesthesia was commonly encountered, but in most cases this was not the result of preoperative dehydration. Little evidence was discovered to indicate that intestinal preparation in large bowel cancer results in significant fluid and electrolyte imbalance or that these patients are hypovolemic when anesthetized.

0472 NEOPLASTIC LESIONS OF THE COLON AND ANORECTUM IN BLACKS. *(E.)* Kolade, S. O.; Chung, E. B.; White, J. E.; Leffall, Jr., L. D. (Howard Univ. Cancer Res. Ctr., Washington, D. C.). *J. Natl. Med. Assoc.* 65(2):142-148, 1973.

A study was made of 394 neoplastic lesions of the colon and anorectal regions in black patients (102 males and 128 females aged 23-91 yr) treated over a 16 yr period. The clinical presentation is identical with that found in white patients. However, the incidence of adenocarcinoma in the young age group seems higher than that reported in whites. A ratio of 3.5:1 female to male is observed in patients of 30 yr and less. The mean ages for adenocarcinoma in male and females are similar to those observed in a predominantly white patient population. The adult incidence of mucinous adenocarcinoma, is double that of white populations. This colloid histological variety appears uniformly devastating regardless of age. Of the total number of adenocarcinomas in the series 3.9% occurred in the age group under 30 yr. The symptomatology in this young group is similar to that of adults, though it is not of any distinctive pattern. One patient had 2 synchronous primaries while 2 patients had 2 metachronous primaries. Carcinomas of other organs in addition to their colon lesions occurred in 2 patients. Thirteen polyps, 10 villous and 3 adenomatous, showed histological evidence of malignancy. Polyps accompanied the carcinomas in 19 cases. The 5-yr survival rate for followed patients who underwent curative surgery vas 50%.

)473 MESENTERIC INFARCTION. DIAGNOSTIC AND THERAPEUTIC ENIGMAS. *(E.)* Mattox, K. L.; Guinn,
. A. (Baylor Coll. Med., Waco, Texas). *Am. J. Surg.*
26(3):332-335, 1973.

owel infarction was studied in 38 patients (37 males
nd 1 female, median age 64 yr). Nonocclusive mesen-
eric ischemia in which the distal mesenteric arteries
nd veins were patent occurred in 20 patients, in 7
f whom noncritical stenosis of the proximal superior
esenteric artery caused by arteriosclerosis was a
actor. Occlusion of the superior artery with throm-
osis occurred in 9 patients, thrombosis of the mesen-
eric vein in 6, embolism of the superior mesenteric
rtery in 2, and arteriolar occlusion secondary to
olyarteritis in 1. Most patients presented with
odominal pain and distention, vomiting, diarrhea,
 gastrointestinal bleeding. In most of these pa-
ents, one of the commonly recognized causes pre-
pitated the condition, but in 16 of the 38 signi-
cant obstruction of the intestinal blood supply was
used by arteriosclerosis. It is suggested that
terial obstruction was a significant factor in these
tients, even though thrombosis of the major vessels
s usually absent. The only patients to survive in
is series were those with limited bowel infarction
d early adequate resection.

74 LATE COMPLICATIONS OF RADIATION-INDUCED DAMAGE TO THE GASTRO-INTESTINAL TRACT.
) Wolloch, Y.; Chaimoff, C.; Dintsman, M.
el Aviv Univ. Med. Sch., Israel). *Am. J. Proctol.*
(6):473-480, 1973.

e complications of radiation-induced damage to
 gastrointestinal tract are presented in 9 pa-
ents. Of these cases 8 were irradiated due to
cinoma of the uterus or cervix, while 1 was
adiated after nephrectomy for carcinoma of the left kidney. In 3 patients a colostomy was performed because of severe inflammation and narrowing of the rectosigmoid region. Another patient, with gangrene of the sigmoid, underwent resection of the damaged bowel and colostomy. She died several weeks later because of a pelvic abscess, the result of a perforation of the terminal ileum. At autopsy gangrene of the anterior rectal wall and of the lower segments of both ureters was also found. In the patient irradiated after nephrectomy, an operation performed 2.5 yr later, because of a suspected tumor of the splenic flexure of the colon, revealed a circular stricture induced by radiation. Four other patients are still receiving regular enemata of hydrocortisone, sedatives, and a low residue diet over a period ranging from 10 months to 3 yr and 10 months, because of persisting activity of the disease. Despite the large number of women who receive radiotherapy, only a small percentage suffer damage to the gastrointestinal tract. It appears that an individual sensitivity to the effect of irradiation exists, and that radiation induced damage to the gastrointestinal tract will appear in these more sensitive patients.

0475 PATHOLOGIC CHANGES IN THE COLON PRODUCED BY ANTHRAQUINONE PURGATIVES. *(E.)*
Smith, B. (St. Bartholomew's Hosp., London, England). *Dis. Colon Rectum* 16(6):455-458, 1973.

Pathologic changes produced by anthraquinone purgatives were studied in 13 specimens of colon from 12 patients. The morbid anatomic changes seen in the cathartic colon consist of three main features: damage and loss of the intrinsic innervation, atrophy of the smooth muscle coat, and melanosis coli. Changes seen in the myenteric plexus of the longstanding purgative addict consist of loss of neurons and replacement of the ganglia by Schwann cells. Macroscopic examination of the bowels showed them to be thin-walled.

0476 WESTERN CIVILIZATION, DIET, AND DISEASE. *(E.)* Burkitt, D. P. (Med. Res. Coun., London, England). *Drug Ther.* 4(1):51-62, 1974.

0477 ABDOMINO-TRANSSACRAL RESECTION AND ANASTOMOSIS FOR MID-RECTAL CANCER. *(E.)* Localio, S. A.; Baron, B. (New York Univ. Med. Ctr., N.Y.). *Ann. Surg.* 178(4):540-546, 1973.

0478 61 CASES OF VOLVULUS OF THE SIGMOID COLON, PLACE OF IDEAL EMERGENCY COLECTOMY. *(Fr.)* Cornet, S.; Angate, Y.; Breton, P.; Coulibaly, A. O.; Benoit, G. (Treichville Hosp., France). *Chirurgie* 99(4):255-261, 1973.

0479 TREATMENT OF ACQUIRED MEGACOLON IN THE ADULT. CONSIDERATIONS ON DUHAMEL'S TECHNIQUE WITH PERINEAL COLOSTOMY. *(Fr.)* Raia, H.; Raia, A. (Fac. Med., Univ. Sao Paulo, Brazil). *Chirurgie* 99(5):293-298, 1973.

0480 ACUTE NECROSING COLITIS. *(Fr.)* Seyer, J.; Lamy, M.; Fondimare, A.; Bourg, P. (Hotel-Dieu Hosp., Rouen, France). *Chirurgie* 99(5):327-331, 1973.

0481 FISTULAS COMPLICATING DIVERTICULAR DISEASE OF THE SIGMOID COLON. *(E.)* Colcock, B. P.; Stahmann, F. D. (Cook County Hosp., Chicago, Ill.). *Lahey Clin. Found. Bull.* 23(1):1-12, 1974.

0482 CHRONIC CONSTIPATION IN CHILDREN DUE TO ACHALASIA OF THE INTERNAL ANAL SPHINCTER. *(Ger.)* Hecker, W. Ch.; Holschneider, A.; Fendel, H.; Schauer, A.; Meister, P.; Beige, H. (Child. Surg. Clin., Univ. Munich, Germany). *Dtsch. Med. Wochenschr.* 98(49):2334-2340, 1973.

0483 EFFECT OF PREOPERATIVE NEOMYCIN-ERYTHROMYCIN INTESTINAL PREPARATION ON THE INCIDENCE OF INFECTIOUS COMPLICATIONS FOLLOWING COLON SURGERY. *(E.)* Nichols, R. L.; Broido, P.; Condon, R. E.; Gorbach, S. L.; Nyhus, L. M. (VA Hosp., Chicago, Ill.). *Ann. Surg.* 178(4):453-462, 1973.

0484 THE COLITIS OF BEHCET'S DISEASE: A SEPARATE ENTITY? *(E.)* Smith, G. E.; Kime, L. R.; Pitcher, J. L. (William Beaumont Gen. Hosp., El Paso, Tex.). *Am. J. Dig. Dis.* 18(11):987-1000, 1973.

0485 HEMANGIOMA OF THE COLON. *(E.)* Head, H. D.; Baker, J. Q.; Muir, R. W. (Walter Reed Gen. Hosp., Washington, D.C.). *Am. J. Surg.* 126(4): 691-694, 1973.

0486 POLYP CONTROVERSY. *(E.)* Weiss, O. (VA Hosp., Lyons, N.J.). *Am. J. Proctol.* 24(6):481-485, 1973.

0487 PNEUMATOSIS COLI. *(E.)* O'Reilly, K. (no affil.). *Aust. N.Z. J. Surg.* 43(2):144-149, 1973.

0488 ENDOSCOPIC REMOVAL OF COLON LIPOMAS. *(E.)* Papp, J. P.; Haubrich, W. S. (Blodgett Memorial Hosp., Grand Rapids, Mich.). *Gastrointest. Endosc.* 20(2):66-67, 1973.

0489 INTRAVENOUS PYELOGRAPHY IN COLORECTAL SURGERY. *(E.)* Prager, E.; Swinton, N. W.; Corman, M. L.; Veidenheimer, M. C. (Lahey Clin. Fdn., Boston, Mass.). *Dis. Colon Rectum* 16(6):479-481, 1973.

0490 FIBRE AND CANCER OF THE COLON. *(E.)* Irving, D.; Drasar, B. S. (London Sch. Hyg. Trop. Med., England). *Br. J. Cancer* 28(5):462-463, 1973.

0491 CAECAL PERFORATION IN LARGE-BOWEL OBSTRUCTION. *(E.)* Duraiappah, B.; Pheils, M. T. (Repatriation Gen. Hosp., Concord, Mass.). *Aust. N.Z. J. Surg.* 43(2):132-136, 1973.

0492 TOXIC MEGACOLON. *(E.)* Ripstein, C. B.; Weiner, E. A. (Miami Sch. Med., Fla.). *Dis. Colon Rectum* 16(5):402-408, 1973.

0493 INTESTINAL OBSTRUCTION DUE TO INTRAMURAL HEMATOMA OF THE COLON, A COMPLICATION OF SODIUM WARFARIN THERAPY: REPORT OF A CASE. *(E.)* Patel, D. R.; Shrivastav, R.; Hand, G. (Orange Mem. Hosp. Unit, N.J.). *Dis. Colon Rectum* 16(5):416-418, 1973.

0494 COLONIC DIVERTICULA AND HEMORRHAGE. *(E.)* Gennaro, A. R.; Rosemond, G. P. (Temple Univ. Hlth. Sci. Ctr., Philadelphia, Pa.). *Dis. Colon Rectum* 16(5):409-415, 1973.

0495 THE FATE OF THE NEGATIVE APPENDIX. *(E.)* Chang, F. C.; Hogle, H. H.; Welling, D. R. (Univ. Utah Med. Ctr., Salt Lake City). *Am. J. Surg.* 126(6):752-754, 1973.

0496 ISCHEMIC PROCTOSIGMOIDITIS: REPORT OF A CASE. *(E.)* Cynn, W. S.; Rickert, R. R. (New Jersey Med. Sch., Newark). *Dis. Colon Rectum* 16(6):537-541, 1973.

0497 COEXISTING CARCINOMA WITH PERIDIVERTICULITIS OF THE COLON. *(E.)* Bacon, H. E.; Tse, G. N.; Herabat, T. (no affil.). *Dis. Colon Rectum* 16(6):500-503, 1973.

0498 COLORECTAL ENDOMETRIOSIS. *(E.)* Ponka, J. L.; Brush, B. E.; Hodgkinson, C. P. (Henry Ford Hosp., Detroit, Mich.). *Dis. Colon Rectum* 16(6):490-499, 1973.

0499 COMPLICATIONS OF COLOSTOMY. *(E.)* Saha, S. P.; Rao, N.; Stephenson, S. E. (Univ. Hosp. Jacksonville, Fla.). *Dis. Colon Rectum* 16(6):515-516, 1973.

0500 IRREVERSIBLE ISCHEMIC COLITIS CAUSED BY STENOSIS OF SIGMOID BRANCHES: A CASE REPORT. *(E.)* Lambana, S.; Yamamoto, K.; Miyashita, T.; Tsuchiya, K. (1st Dept. Surg., Kanazawa Univ., Japan). *Surgery* 74(4):587-592, 1973.

0501 PREVENTION OF POSTOPERATIVE INTESTINAL ADHESIONS IN PRIMATES. *(E.)* Liao, S. -K.; Suehiro, G. T.; McNamara, J. J. (Queen's Med. Ctr., Honolulu, Hawaii). *Surg. Gynecol. Obstet.* 137(5): 816-820, 1973.

0502 VASCULAR INFLUENCES ON INTESTINAL LYMPH FLOW AND THEIR RELATIONSHIP TO OPERATION FOR CARCINOMA OF THE INTESTINE. *(E.)* Ackerman, N. B. (Menorah Med. Ctr., Univ. Missouri, Kansas City). *Surg. Gynecol. Obstet.* 137(5):801-804, 1973.

0503 PERSISTENT DIARRHEA DUE TO SUCRASE-ISOMALTASE DEFICIENCY IN A POSTOPERA-TIVE CHILD WITH HIRSCHSPRUNG'S DISEASE. *(E.)* Ament, M. E.; Bill, A. H. (Univ. California, Los Angeles, Med. Sch.). *J. Pediatr. Surg.* 8(4):543-545, 1973.

0504 APPENDICULAR PERITONITIS IN NURSING CHILDREN. (FOUR OBSERVATIONS BEFORE 1 EAR OF AGE). *(Fr.)* Fossey, F.; Bizos, J. C.; leunier, M.; Delaitre, R. (Clin. Med. Infant., ngers, France). *Gazette Med.* 80(24):4027-4037, 973.

505 CARCINOMA OF THE RECTUM WITH LIVER METASTASES. PROGNOSIS AND OPERATIVE INDI-ATIONS. *(E.)* Nielsen, J.; Balslev, I.; Fenger, . J.; Jensen, H. E.; Kragelund, E. (Municipal Hosp., openhagen, Denmark). *Acta Chir. Scand.* 139(5): 79-481, 1973.

506 AUTORADIOGRAPHIC METHOD FOR AN EXPANDED ASSESSMENT OF COLONIC CYTOLOGY. *(E.)* eschner, E. E.; Long, F. C.; Katz, S. (Mem. Hosp., ew York, N.Y.). *Acta Cytol.* 17(5):435-438, 1973.

07 THE CANCER OF THE RECTUM. ABDOMINOPERINEA AMPUTATION VERSUS ANTERIOR RESECTION WITH LORECTAL ANASTOMOSIS. *(Fr.)* Dereume, J. P.; Smet P.; Gerard, A. (Univ. St. Pierre Hosp., Brussels, Belgium). *Acta Gastroenterol. Belg.* 36(4/5):260-267, 1973.

0508 VILLOUS TUMORS OF THE LARGE BOWEL. *(E.)* McCabe, J. C.; McSherry, C. K.; Sussman, E. B.; Gary, G. F. (New York Hosp., N.Y.). *Am. J. Surg.* 126(3):336-342, 1973.

0509 COMPARATIVE HISTOCHEMICAL AND ULTRASTRUCTURAL STUDY OF PIGMENTS IN MELANOSIS COLI AND DUBIN-JOHNSON SYNDROME. *(Fr.)* Kermarec, J.; Duplay, H.; Daniel, R. (Univ. Hosp. Ctr., Nice, France). *Ann. Biol. Clin. (Paris)* 30(6):567-577, 1972.

0510 REPORT OF A CASE OF PROABLY COLONIC URTICARIA: ROENTGENOLOGIC ASPECTS. *(E.)* Blery, M.; Gaux, J. C.; Ferrier, J. P.; Bismuth, V. (Ambroise-Pare Hosp., Bologne, France). *Arch. Fr. Mal. App. Dig.* 62(4):331-335, 1973.

0511 NEOPLASTIC PERFORATIONS OF THE COLON INTO THE FREE PERITONEUM. *(Fr.)* Hay, J. M.; Pouret, J. P. (Lariboisiere Hosp., Paris, France). *Lyon Chir.* 69(1):44-46, 1973.

0512 INDICATIONS AND SURGICAL PROCEDURES IN SIGMOID DIVERTICULITIS: REASONS FOR PROPHYLACTIC RESECTION. *(Fr.)* Berdelis, C. A. (Surg. Clin. B., Univ. Athens, Greece). *Lyon Chir.* 69(3): 207-210, 1973.

0513 TREATMENT OF FUNCTIONAL INTESTINAL DISTURBANCES. *(It.)* Franken, F. H. (St. Josef's Hosp., Wuppertal-Elberfeld, Germany). *Minerva Med.* 64(14):685-687, 1973.

0514 ROENTGENOLOGY OF COLON ATRESIA. *(E.)* Bley, W. R.; Franken, Jr., E. A. (Indiana Univ. Med. Ctr., Indianapolis). *Pediatr. Radiol.* 1(2):105-108, 1973.

0515 CHEMICAL CARCINOGENS AND THEIR MODE OF ACTION IN COLONIC NEOPLASIA. *(E.)*. Weisburger, J. H. (Amer. Health Fdn., New York, N.Y.). *Dis. Colon Rectum* 16(6):431-437, 1973.

0516 COMPLICATIONS OF MECKEL'S DIVERTICULUM. *(Fr.)* Borde, J.; Lefort, J. (Charles Nicolle Hosp., Rouen, France). *Gazette Med.* 80(13): 2207-2214, 1973.

See also, 0277, 0278, 0291, 0297, 0322, 0406, 0421, 0422, 0424, 0427, 0428, 0520, 0525, 0643, 0676, 0681, 0692, 0706, 0722, 0762, 0778, 0793.

LARGE INTESTINE

Ulcerative Colitis

0517 HEMORRHAGIC RECTOCOLITIS AND AUTOIMMUNE HEMOLYTIC ANEMIA. *(Fr.)* Carcassonne, Y. (Conception Hosp., Marseille, France). *Med. Chir. Dig.* 2(2):67-72, 1973.

Case reports are presented for 2 men, aged 21 and 23 yr, resp., who developed ulcerative colitis and, subsequently, hemolytic anemia, positive Coomb's tests, and splenomegaly. In the older patient the colitis responded to local treatment with corticosteroids and antibiotics, but anemia persisted and became more severe despite cortisone, blood transfusions, azathioprine, and anti-lymphocyte serum. Splenectomy became necessary and was followed by anoxic coma, severe respiratory infection, volvulus of the small intestine, dilatation of the stomach, and phlebitis. The anemia finally responded to iron protoxalate, and bilirubin levels returned to normal. The blood picture was satisfactory 1 yr later, but an exacerbation of the colitis occurred. The younger patient presented with joint symptoms and soon developed deformities of the hands and fingers. Repeated Waaler-Rose and latex tests for rheumatoid arthritis were negative. Diarrhea developed and ulcerative colitis was diagnosed 1 yr later. Splenomegaly and severe hemolytic anemia necessitated splenectomy, after which the anemia improved greatly but joint symptoms and melena persisted. From these findings and other reports in the literature it is concluded that these patients have an immunological disorder which favors the production of many antibodies and results in several diseases with different clinical features which have the same basis.

0518 EPSILON-AMINOCAPROIC ACID THERAPY IN ULCERATIVE COLITIS. *(E.)* Mowat, N. A. G.; Douglas, A. S.; Brunt, P. W.; McIntosh, J. A. R.; King, P. C.; Boddy, K. (St. Bartholomew's Hosp., London, England). *Am. J. Dig. Dis.* 18(11):959-965, 1973.

0519 MUCOSAL BIOPSY IN ULCERATIVE COLITIS FOR EVALUATING TOPICAL HYDROCORTISONE THERAPY. *(E.)* Kratzer, G. L.; Panas, P. G.; Onsanit, T. (Allentown Hosp., Pa.). *Dis. Colon Rectum* 16(6): 468-472, 1973.

0520 IS NON-SPECIFIC ULCEROUS COLITIS A PRECANCEROUS CONDITION? *(Rus.)* Judin, I. Iu.; Ginzburg, S. N. (Inst. Exp. Clin. Oncol., Moscow, USSR). *Vopr. Onkol.* 19(8):49-54, 1973.

0521 ACUTE DILATATION OF THE COLON IN PATIENTS WITH PROCTOCOLITIS. *(Czech.)* Novak, J.; Nedbal, J.; Maratka, Z.; Hledik, E. (Surg. Klin. ILF, Prague, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 27(1):8-15, 1973.

0522 CHRONIC SEGMENTAL FORMS OF COLITIS. *(Fr.)* Loizeau, E. (Cantonal Hosp., Geneva, Switzerland). *Rev. Fr. Gastroenterol.* (86):49-57, 1973.

0523 POSTOPERATIVE ACUTE ISCHEMIC COLITIS. *(Ger.)* Muhe, E.; Hermanek, P. (Surg. Clin., Univ. Erlangen, Germany). *Ver. Dtsch. Ges. Pathol.* 56:570-572, 1972.

0524 ULCERATIVE COLITIS IN CHILDHOOD. *(E.)* Toccalino, H.; Guastavino, E.; Carretero, L. L. (Alejandro Posadas Polyclin., Haedo, Argentina). *Acta Gastroenterol. Latinoam.* 5(2):79-85, 1973.

See also, 0552.

PANCREAS

0525 GASTROINTESTINAL RADIOLOGICAL FINDINGS IN CYSTIC FIBROSIS. *(E.)* Djurhuus, M. J.; Lykkegaard, E.; Pock-Steen, O. C. (Frederiksberg Hosp., Copenhagen, Denmark). *Pediatr. Radiol.* 1(2): 113-118, 1973.

A quantitative assessment was made of radiological gastrointestinal tract findings in 27 children (aged 1 1/2 to 16 yr) with cystic fibrosis and in 37 control patients (aged 2 to 13 yr). Compared with controls, the plicae and intestinal wall were wider in patients with cystic fibrosis; the maximal relative diameter of the intestine was greater; and transit time through the small intestine and proximal part of the colon was slower. Filling defects and spiculae were found in the colon and small intestine of nearly all, in the duodenum in about one-half, and in the stomach in one-fourth of the patients with cystic fibrosis. Diagnostically less important findings of decreased peristalsis, flocculation, fragmentation, segmentation, and a mottled appearance of the colon were observed more often in patients with cystic fibrosis than in controls. The spiculae were probably caused by intrusion of contrast medium into dilated crypts and the filling defects by the adjacent mucosa. These defects are rare in small intestinal disease and are thus of great diagnostic value for cystic fibrosis.

0526 CURRENT CONCEPTS IN MANAGEMENT OF PERIAMPULLARY CARCINOMA. *(E.)* Warren, K. W. (Lahey Clin. Fdn., Boston, Mass.). *Am. Surg.* 39(12):667-672, 1973.

0527 FLEXION INJURIES OF THE PANCREAS. *(E.)* Holmes, G. (Lautoka Hosp., Fiji). *N.Z. Med. J.* 78(500):302-303, 1973.

0528 PATTERNS OF INJURY REQUIRING PANCREATODUODENECTOMY. *(E.)* Sturm, J. T.; Quattlebaum, F. W.; Mowlem, A.; Perry, J. F. (Saint Paul-Ramsey Hosp., St. Paul, Minnesota). *Surg. Gynecol. Obstet.* 137(4):629-632, 1973.

0529 CHRONIC CASSAVA TOXICITY: POSSIBLE RELATIONSHIP TO CHRONIC PANCREATIC DISEASE IN MALNOURISHED POPULATIONS. *(E.)* Pitchumoni, C. S.; Thomas, E. (Metro. Hosp. Ctr., New York, N.Y.). *Lancet* 7842:1397-1398, 1973.

0530 BILATERAL PROPTOSIS DUE TO CARCINOMA OF PANCREAS. A CASE REPORT WITH AUTOPSY FINDINGS). *(E.)* Narang, N. K.; Bhandari, V. M.; Mathur, D. S.; Duggal, N. (Med. Coll., Jaipur, India). *J. Assoc. Physicians India* 21(3):331-333, 1973.

0531 THE PARTICIPATION OF EXOCRINE ACTIVITY OF THE PANCREAS IN THE CLINICAL SYMPTOMS OF JUVENILE HYPERLIPOPROTEINEMIA. *(Pol.)* Herfort, K.; Sobra, J.; Heyrovsky, F. (2nd Res. Clin. Gastroenterol., Charles Univ., Prague, Czechoslovakia). *Pol. Arch. Med. Wewn.* 49(5):419-422, 1972.

See also, 0247, 0248, 0251, 0252, 0261, 0267, 0274, 0275, 0281, 0294, 0324, 0350, 0356, 0413, 0450, 0545.

PANCREAS

Pancreatitis

0532 REPERCUSSIONS OF PANCREATITIS ON THE SPLEEN. *(Fr.)* Longo, O. F.; Mammana, L. A.; d'Agostino, J.; Huarte, C.; Nani, C.; Ferraria, A. (San Roque Hosp., Cordoba, Argentina). *Nouv. Presse Med.* 2(17):1125-1126, 1973.

In a 10-yr period, complications involving the spleen develcped in 7 of 26 patients with pancreatitis (12 with acute and 14 with chronic pancreatitis). Stasis resulted in splenomegaly in 3 cases (2 acute and 1 chronic). In 2 of these patients lymphography showed that contrast medium stopped flowing in the pancreatic region. Pseudocysts of the spleen, which occurred in 2 cases, were visualized by arteriography. Infections of the spleen were the cause of death in the 2 remaining patients; septic thrombosis was present at autopsy in 1. Complications of pancreatitis involving the spleen are attributed to the close relation between the pancreas and vascular and lymphatic parts of the spleen.

0533 INDIVIDUALIZATION IN TREATMENT OF PANCREATIC CYSTS. *(E.)* Warren, K. W.; Badosa, F. (Lahey Clin. Fdn., Boston, Mass.). *Am. Surg.* 39(10):555-561, 1973.

0534 HEMORRHAGIC PANCREATIC PSEUDOCYSTS. *(Sp.)* Machado, M. C. C.; Cunha, J. C.; Mott, C. B.; Okumura, M.; Bove, P.; Bettarello, A.; Raia, A. (Univ. Sao Paulo Med. Sch., Brazil). *Arq. Gastroenterol. (Sao Paulo)* 10(2):131-138, 1973.

0535 HEREDITARY PANCREATITIS: REPORT OF THE FIRST KINDRED IN ITALY. *(E.)* Scuro, L. A.; Dobrilla, G.; Angelini, G.; Cabaliini, G.; Vantini, I.; Barba, A. (no affil.). *Acta Hepato-gastroenterol. (Stuttg.)* 20(1):70-76, 1973.

0536 POST-ENDOSCOPY PANCREATITIS AND HYPERAMYLASURIA. *(E.)* Blackwood, W. D.; Vennes, J. A.; Silvis, S. E. (Texas Tech. Univ. Sch. Med., Lubbock). *Gastrointest. Endosc.* 20(2):58-58, 1973.

0537 POSSIBILITIES OF DETERMINATION OF TRYPSIN IN THE BLOOD SERUM OF PATIENTS WITH PANCREATITIS. *(Rus.)* Lapchinski, I. D. (Kiev Med. Inst., USSR). *Vrach. Delo* (9):96-99, 1973.

0538 A STUDY OF THE PANCREATIC EXTERNAL SECRETORY FUNCTION IN PATIENTS WITH CHRONIC CHOLECYSTITIS, CHOLECYSTOPANCREATITIS AND POST-CHOLECYSTECTOMY SYNDROME. *(Rus.)* Brestkina, M. D.; Melnichenko, L. Y. (no affil.). *Vrach. Delo.* 6:94-97, 1973.

See also, 0251, 0253, 0261, 0269.

0539 PAPAVERINE - HEPATOTOXIC OR NOT? *(E.)* Drieman, P. M. (Camarillo State Hosp., Calif.). *J. Am. Geriatr. Soc.* 21(5):202-205, 1973.

A study was made of 30 patients (aged 52-88 yr) with organic brain syndrome in whom liver function tests showed normal results. These tests were performed before papaverine therapy and at 2, 4, 6, and 8 weeks after the start of this treatment. Papaverine was administered in 2 capsules every 12 hr, for a dosage of 600 mg/day. In 53% of the cases, therapy had ceased by the 6th week due to abnormal test results. At the conclusion of the study only 14 patients were still taking papaverine. During the study 18 patients reacted to the drug with abnormally high levels of alkaline phosphatase (the highest being 8.28 U); 4 patients (13%) had high SGOT and SGPT levels; and 6 (20%) had increased eosinophil counts. Nausea, vomiting, jaundice or dark urine did not occur in any of the cases. Tranquilizers were not taken by those patients in whom liver function was abnormal. It is suggested that hepatic hypersensitivity to papaverine may be the cause of the abnormal liver function test results.

0540 CONGENITAL FIBROSIS AND POLYCYSTIC DISEASE OF LIVER AND KIDNEYS. *(E.)* Thaler, M. M.; Ogata, E. S.; Goodman, J. R.; Piel, C. F.; Korobkin, M. T. (Dept. Pediatr., Univ. California, San Francisco). *Am. J. Dis. Child.* 126(3):374-380, 1973.

The presence of macrocysts and microcysts in kidneys and liver of a 15-yr-old girl with systemic and portal hypertension, thrombocytopenia, and hepatosplenomegaly was demonstrated by roentgenographic, surgical, and histologic investigations. Extensive deposits of collagen interposed between hepatocytes and proliferating biliary structures and distributed around dilated renal tubules were observed by ultrastructural studies. It is suggested that excessive and abnormally distributed connective tissue may represent the underlying defect in polycystic disease of the liver and kidneys and in congenital hepatic fibrosis.

0541 HEPATOTOXICITY OF METHOTREXATE IN THE TREATMENT OF PSORIASIS. *(E.)* Palmer, H. M. (Withington Hosp., Manchester, England). *Practitioner* 211(1263):324-328, 1973.

Methotrexate was given to 23 of 37 psoriatics (aged 33-68 yr) in interrupted daily oral dosage for up to 78 months. Total cumulative dosage ranged from 0.09 to 4.125 g. Abnormal liver biopsies were found in 16 (69.5%) of these patients: 3 (13%) were frankly cirrhotic, 4 (17.4%) showed mild to moderate hepatic fibrosis and 9 (31%) had varying degrees of fatty change. Of the cirrhotics 2 consumed excessive amounts of alcohol, the third admitted to taking alcohol only rarely. The liver damage did not correlate with either duration of therapy or cumulative dosage of methotrexate.

0542 PROFILES OF SERUM ISOENZYMES OF ALKALINE PHOSPHATASE IN HEPATOBILIARY DISORDERS USING CELLULOSE ACETATE ELECTROPHORESIS AND ORGAN-SPECIFIC INHIBITORS. *(E.)* Rhone, D. P.; Mizuno, F. M.; Gidaspow, H. (Illinois Masonic Med. Ctr., Chicago). *Ann. Clin. Lab. Sci.* 3(5):353-361, 1973.

The isoenzymes of alkaline phosphatase in the serum of 30 normal subjects (14 male and 16 female) and 90 patients with common hepatobiliary disorders were distinguished using electrophoresis on cellulose acetate. Diagnoses included nutritional cirrhosis (15), infectious hepatitis (16), serum hepatitis (9), metastatic tumors (23), obstructive jaundice (20), cholangitis (3), chronic hepatic congestion (1), hepatocellular carcinoma (1), granulomatous hepatitis (1), and adenocarcinoma of the colon metastatic to the liver (1). Physicochemical profiles of these mixtures of serum isoenzymes were determined using thermostability and organ-specific inhibitors (urea, L-phenylalanine, and L-homoarginine). Results of this investigation indicate that, in most cases, physicochemical testing is not sufficient alone to differentiate specific mixtures of alkaline phosphatase isoenzymes in the sera of healthy persons or in patients with hepatobiliary diseases. However, electrophoresis can identify individual components of a mixture of alkaline phosphatase isoenzymes in serum. It is suggested that densitometric scanning is the best method if quantitative data are required. It is also concluded that no hepatobiliary disorder studied in this series presents a particular physicochemical profile using heat inactivation and organ-specific inhibitors.

0543 HYPOTIBRINOGENEMIA ASSOCIATED WITH HEMANGIOMA OF THE LIVER. *(E.)* Martinez, J.; Shapiro, S. S.; Holburn, R. R.; Carabasi, R. A. (Cardeza Fdn. Hematol. Res., Philadelphia, Pa.). *Am. J. Clin. Pathol.* 60(2):194-197, 1973.

Blood clotting status was investigated in a 42-yr-old man with hemangioma of the liver, hypofibrinogenemia, a 9-yr-history of hepatomegaly, and no history suggestive of an increased bleeding tendency. Measurement of the plasma coagulation factors revealed decreased fibrinogen concentration, short euglobulin lysis time, prolonged thrombin time, and an increase of fibrinogen-fibrin split products. Platelet count, RBC survival, and plasma levels of Factors VIII, V, and prothrombin were within normal limits. ^{125}I-prothrombin metabolic values showed a normal prothrombin half-life and fractional catabolic rate. However, fibrinogen half-life was short and the fractional catabolic rate was increased. These studies suggest that this patient's hypofibrinogenemia might be caused by a fibrinolytic process unrelated to intravascular coagulation. Although the mechanism for activation of fibrinolysis is unknown in this patient, it is possible that a plasminogen activator may be released from endothelial cells of the hemangioma.

0544 DETERMINANTS OF SERUM ANTIPYRINE HALF-LIVES IN PATIENTS WITH LIVER DISEASE. *(E.)*

Branch, R. A.; Herbert, C. M.; Read, A. E. (Dept. Med., Univ. Bristol, England). *Gut* 14(7):569-573, 1973.

Antipyrine (1200 mg, p.o.) was used as a model drug to investigate the effects of liver disease on drug metabolism in 14 normal controls (aged 20-48 yr) and in 38 patients with liver disease including cirrhosis, chronic active hepatitis, acute hepatitis, and obstructive jaundice. A prolongation in antipyrine half-life was found in patients with liver disease. This increase was greater in patients with chronic liver disease than in those with acute, reversible pathology. Clinical complications of portosystemic anastomosis, portosystemic encephalopathy, and fluid retention did not affect antipyrine half-life. Patients with serum albumin below 3 g/100 ml or a prothrombin index below 80% had prolonged antipyrine half-life. Serum bilirubin, alkaline phosphatase, and aspartate transaminase did not correlate with prolonged half-life. The most prolonged half-life was associated with hypoalbuminemia and hypoprothrombinemia, suggesting that these changes were caused by defective protein synthesis of microsomal enzyme protein. This hypothesis was supported by demonstrating that the enzyme-inducing agents, phenobarbitone and prednisone, which increase the amount of microsomal enzyme protein, reduced the antipyrine half-life.

0545 CARCINOEMBRYONIC ANTIGEN IN SERUM IN DISEASES OF THE LIVER AND PANCREAS. *(E.)*

Khoo, S. K.; Mackay, I. R. (Walter and Eliza Inst. Med. Res., Melbourne, Australia). *J. Clin. Pathol.* 26(7):470-475, 1973.

Carcinoembryonic antigen was measured by microradioimmunoassay in whole serum and in serum extracted with perchloric acid in patients with benign and malignant diseases of the liver and pancreas. The level of detectability was 5 ng/ml. This level or greater was present in the serum of 50% of 115 patients with chronic diffuse liver disease, 64% of 14 patients with acute or chronic relapsing pancreatitis, 94% of 138 patients with cancer of the digestive system, and 3% of 230 controls. The incidence of levels of carcinoembryonic antigen of 5 ng/ml or more differed for various categories of chronic liver disease: 22% in 58 patients with active chronic hepatitis, 46% in 13 with primary biliary cirrhosis, 63% in 16 with hepatoma, 78% in 9 with cryptogenic cirrhosis, and 88% in 35 with alcoholic cirrhosis. Levels of carcinoembryonic antigen correlated with degrees of impairment of liver function as judged by BSP retention and serum levels of alkaline phosphatase and transaminase. In pancreatitis, 64% of cases had levels of carcinoembryonic antigen ranging from 5 to 20 ng/ml and in cancer of the pancreas 94% had levels above 5 ng/ml and 50% above 20 ng/ml. Although these results suggest that functional impairment of the liver is an important cause of increased levels of carcinoembryonic antigen, other causes must be invoked to account for the findings in pancreatitis, and the effects of inflammatory amage and cellular damage and regeneration remain o be assessed.

0546 CARBOHYDRATE METABOLISM IN PATIENTS WITH PRIMARY HEPATOCELLULAR CARCINOMA. *(E.)*

Vinik, A. I.; Pooler, W. (King Edward VIII Hosp., Durban, South Africa). *Clin. Sci. Mol. Med.* 45(3):387-396, 1973.

Responses to a glucose load (50 g, p.o.) and sodium tolbutamide (1 g, i.v.) have been compared in 13 Bantu patients (12 males and 1 female; aged 23-75 yr) with hepatocellular carcinoma and 10 control subjects. Patients with metabolic diseases affecting carbohydrate metabolism and those with a family history of diabetes, or ingestion of drugs were excluded from the control group. Lower basal plasma glucose and immunoreactive insulin concentrations were found in the hepatoma patients. Plasma insulin responses to glucose and tolbutamide were impaired, whether considered as the absolute concentrations or related to the plasma glucose concentrations as an insulinogenic index. Increased endogenous insulin sensitivity and hypoglycemic unresponsiveness as shown by a greater and more sustained fall in glucose concentration following i.v. administration of tolbutamide was also demonstrated in hepatoma patients. Basal growth hormone concentrations were within the normal range and did not rise paradoxically after glucose administration. These findings in hepatoma patients strikingly contrast with those seen in uncomplicated cirrhosis. The presence or absence of background cirrhosis with hepatoma did not alter these findings. This suggests that the tumor may be secreting a principle which either suppresses hepatic gluconeogenesis and/or enhances glucose utilization. The principle is not immunoreactive insulin, but may be other unidentified substances produced by the tumor which have an insulin-like effect.

0547 USE OF ORAL DDT IN THREE HUMAN BARBITURATE INTOXICATIONS: HEPATIC ENZYME INDUCTION BY RECIPROCAL DETOXICANTS. *(E.)*

Rappolt, R. T., Sr. (No affiliation). *Clin Toxicol* 6(2):147-151, 1973.

Three women, aged 18-39 yr, who had ingested moderate to massive (3000 mg) amounts of phenobarbital appeared to improve after p.o. administration of 5 g technical grade DDT in peanut oil. Too short a time elapsed before their recovery for true reciprocal detoxicants to induce hepatic enzymes. One patient was lost to follow-up, and the other 2 are alive and well. One patient had ataxia and anorexia for 5-6 days after barbiturate ingestion. It is suggested that none of these patients had ingested a potentially lethal dose of DDT and that the DDT, acting on a neuromuscular arousal capability of the central nervous system, backtitrated a sublethal dose of barbiturate.

0548 RETICULOENDOTHELIAL PHAGOCYTIC FUNCTION IN HUMAN LIVER DISEASE AND ITS RELATIONSHIP TO HAEMOLYSIS. *(E.)*

Cooksley, W. G. E.; Powell, L. W.; Halliday, J. W. (Dept. Med., Univ. Queensland, Brisbane, Australia). *Br. J. Haematol.* 25(2):147-164, 1973.

The rate of plasma disappearance of radio-iodinated microaggregated human serum albumin (^{125}I-MAA) was used to measure the reticuloendothelial phagocytic capacity in 57 patients with viral, alcoholic, or active chronic hepatitis (11), cirrhosis (42), or miscellaneous acute or chronic liver diseases (4). The relation of reticuloendothelial phagocytic capacity to splenic size, RBC survival, and splenic sequestration of RBC was analyzed. The reticuloendothelial perfusion was also measured using a tracer dose of ^{125}I-MAA. The reticuloendothelial phagocytic index was calculated and found to be increased in all forms of liver disease, independent of etiology or severity. Reticuloendothelial phagocytic capacity was normal in most forms of cirrhosis but was decreased in alcoholic cirrhosis patients, many of whom had diminished reticuloendothelial perfusion, associated with evidence of portal systemic shunting. A close relation between the reticuloendothelial phagocytic capacity and the reticuloendothelial perfusion was demonstrated. The relation between spleen size and reticuloendothelial phagocytic capacity in cirrhosis patients depended on the etiology of the disease. In 24 of 30 patients, the RBC survival was shortened. No correlation was found, however, between the degree of hemolysis and reticuloendothelial phagocytic capacity, reticuloendothelial phagocytic index, or splenic size. Splenic sequestration of RBC was seen in only 2 patients. In hepatic cirrhosis the reticuloendothelial system removes effete RBC presented to it, but is not primarily responsible for the mild hemolytic process.

0549 COPPER DYNAMICS IN WILSON'S DISEASE.

(E.) Osborn, S. B.; Walshe, J. M.; Williams, R. (King's Coll. Hosp., London, England). *Ann. Biol. Clin.* 30(4):391-396, 1973.

After i.v. injection of ^{64}Cu, liver clearance values were determined 100 times on 76 subjects. These consisted of 11 heterozygotes for Wilson's disease, 14 patients with untreated Wilson's disease, 42 patients with treated Wilson's disease, 9 with severe liver disease, 5 with primary biliary cirrhosis, 2 with hemachromatosis, and 17 normal controls. Although there were differences in mean liver clearance values between these groups, the differences were not significant. There was no tendency for liver clearance values to change with time in patients on whom determinations were made before and after institution of treatment. However, somewhat lower clearance values were obtained on inadequately treated patients. The way in which ^{64}Cu moves rapidly out of plasma after i.v. injection suggests that copper atoms do not diffuse between different body compartments, but undergo movement similar to the statistical "first-passage random walk".

0550 AUTOPSY FINDINGS IN THREE ORTHOTOPIC, ALLOGENEIC LIVER TRANSPLANTS IN ADULTS.

(Ger.) Bechtelsheimer, H.; Gedigk, P.; Muller, R.; Lie, T. S. (Pathol. Inst., Univ. Bonn, Germany). *Virchows Arch. Pathol. Anat.* 360(4):287-304, 1973.

Complications and gross and microscopic findings at autopsy are described for 3 patients who underwent orthotopic, allogeneic liver transplantation. All 3 patients received prednisone, azathioprine, and horse antilymphocyte globulin. The first patient, who survived for 202 days, developed transient signs of rejection 5 days after surgery and underwent a hepaticojejunostomy after 35 days for biliary tract necrosis. Signs of late rejection with vascular changes were observed at autopsy. Septicopyemia, caused by an abscess on the abdominal wall, and severe pyelophlebitis of the liver were the major complications. In the second patient, who survived for 6 days, primary ischemic damage of the homograft occurred from a prolonged period of ischemia at body temperature. Signs of acute rejection were found in the liver. The main complications consisted of suppurative cholangitis and pericholangitis, pulmonary embolism, and atelectasis of the lower right lung as a result of paralysis of the right side of the diaphragm caused by severing of branches of the phrenic nerve during surgery. Cardiac and respiratory failure due to pulmonary complications were the immediate cause of death. In the third patient, who also survived for 6 days, there was severe ischemic liver damage due to thrombosis of the hepatic artery with disseminated parenchymal necrosis. Signs of acute rejection were observed around areas of necrosis, but rejection was only mild in other areas of the parenchyma. Other complications included disturbances in bile drainage caused by surgical ligation of the cystic duct; this was associated with severe jaundice and hemorrhagic diathesis. The immediate causes of death were hepatic coma and renal failure.

0551 THE METABOLISM OF CHOLESTANOL, CHOLESTEROL, AND BILE ACIDS IN CEREBROTENDINOUS XANTHOMATOSIS.

(E.) Salen, G.; Grundy, S. M. (VA Hosp., East Orange, N.J.). *J. Clin. Invest.* 52(11):2822-2835, 1973.

Cholesterol and cholestanol metabolism was studied by sterol balance and isotope kinetic techniques in 3 subjects (2 females and 1 male, aged 32-46 yr) with cerebrotendinous xanthomatosis (CTX) and 11 other individuals. All subjects received diets free of cholesterol and cholestanol. After the i.v. administration of [1,2-^{3}H] cholestanol, the sterol was transported and esterified in plasma lipoproteins in a manner identical to cholesterol. The specific activity-time curves of plasma cholestanol conformed to 2-pool models in both the CTX patients and the control group. However, cholestanol plasma concentrations, total body miscible pools, and daily synthesis rates were 2 to 5 times greater in the CTX patients than in controls. The short-term specific activity decay curves of plasma [4-^{14}C] cholesterol also conformed to 2-pool models in both groups. However, in the CTX subjects the decay was more rapid, and daily cholesterol synthesis was nearly double that of the controls. Plasma concentrations and the size of the pool of exchangeable cholesterol were apparently small in the CTX subjects, and did not correlate with the large cholesterol deposits in tendon and tuberous xanthomas. Despite active cholesterol synthesis, bile acid formation was subnormal in the CTX patients. However, a rise in plasma cholestanol levels accompanied bile acid sequestration and greatly augmented fecal cholesanol outputs. In contrast, the administration of clofibrate (2 g/day) lowered plasma cholesterol levels 50% and presumably reduced synthesis in the CTX subjects. Plasma cholesterol concentrations and fecal steroid excretion did not change. These findings indicate that excessive tissue deposits of cholesterol and cholestanol characteristic of CTX are associated with hyperactive neutral sterol synthesis. The demonstration of subnormal bile acid formation suggests that defective bile acid synthesis may predispose to the neutral sterol abnormalities.

0552 MORPHOLOGICAL CHANGES IN THE LIVER IN PATIENTS WITH HEREDITARY HEMOLYTIC JAUNDICE. *(Rus.)* Kartashova, O. Ia.; Krupnikova, E. Z. (Riga Med. Inst., USSR). *Arkh. Patol.* 35(4):42-46, 1973.

0553 ELECTRON MICROSCOPIC STUDIES OF THE SPLEEN AND LIVER IN HEREDITARY SPHEROCYTOSIS. *E.)* Matsumoto, N.; Ishihara, T.; Shibata, M.; chino, F.; Nakashima, K.; Miwa, S. (Yamaguchi niv. Sch. Med., Ube, Japan). *Acta Pathol. Jap.* 3(3):507-530, 1973.

554 THERAPEUTIC CONSTRAINTS IN HEPATIC INSUFFICIENCY. *(E.)* Summerskill, W. H. J. Mayo Clin., Rochester, Minn.). *Adv. Intern. Med.* 8:411-423, 1973.

555 PRIMARY CARCINOMA OF THE LIVER IN VIETNAM. *(Fr.)* That Tung, T.; Thi An, T.; Dang Tam, .; Hoang Phiet, P.; Nhu Bang, N.; That Bach, T.; an Son, H.; Kim Son, D. (Viet Duc Huu Nghi, osp., Hanoi, Vietnam). *Chirurgie* 99(7):427-436, 973.

556 HYPOGLYCEMIA ASSOCIATED WITH LIPID ACCUMULATION IN PRIMARY HEPATOCELLULAR RCINOMA. *(E.)* Yeung, R. T. T.; Yeung, D. C. Y.; , K. S. (Queen Mary Hosp., Hong Kong). *Cancer* (6):1482-1489, 1973.

57 LIVER TRANSPLANTATION IN MAN. *(E.)* Farman, J. V.; Lines, J. G.; Williams, R. ; Evans, D. B.; Samuel, J. R.; Mason, S. A.; hby, B. S.; Calne, R. Y. (Addenbrooke's Hosp., mbridge, England). *Anaesthesia* 29(1):17-32, 74.

58 CLINICAL OUTPATIENT EXPERIENCE WITH URIDINE DIPHOSPHOGLUCOSE IN ACUTE AND RONIC ICTEROGENIC LIVER DISEASES. *(Sp.)* emes Diaz, F.; Conesa Pico, O. R.; Arias Vallejo, (Hermanos Aznar Outpatient Clin., Madrid, ain). *Rev. Esp. Enferm. Apar. Dig.* 40(3): 7-334, 1973.

0559 JAUNDICE FOLLOWING CARDIOPULMONARY BYPASS. *(E.)* Larmi, T. K. I. (Dept. Surg., Univ. Oulu, Finland). *Ann. Chir. Gynaecol. Fenn.* 62:2-8, 1973.

0560 TREATMENT OF HEPATIC TUMOURS BY LIGATION OF THE HEPATIC ARTERY AND INFUSION OF CYTOTOXIC DRUGS. *(E.)* Murray-Lyon, I. M. (King's Coll. Hosp., London, England). *J. R. Coll. Surg. Edinb.* 17(3):156-161, 1972.

0561 PORTAL DIVERSION FOR THE TREATMENT OF GLYCOGEN STORAGE DISEASE IN HUMANS. *(E.)* Starzl, T. E.; Putnam, C. W.; Porter, K. A.; Halgrimson, C. G.; Corman, J.; Brown, B. I.; Gotlin, R. W.; Rodgerson, D. O.; Greene, H. L. (Univ. Colorado Med. Ctr., Denver). *Ann. Surg.* 178(4):525-539, 1973.

0562 AMBULANT LONG TERM THERAPY IN PATIENTS WITH PORTOSYSTEMIC ANASTOMOSES. *(Ger.)* Wagner, K.; Schimmelpfennig, W.; Theuer, D.; Schneider, G.; Burger, K.; Zimmerman, H. B. (2nd Med. Clin., Humboldt Univ., Berlin, Germany). *Z. Gesamte Inn. Med.* 28(11):172-174, 1972.

0563 AN AUTOPSY CASE OF "PSEUDO-ULEGYRIC TYPE" OR HEPATO-CEREBRAL DISEASE. *(E.)* Ishino, H.; Mii, T.; Hirata, J.; Otsuki, S.; Imai, A.; Hiramatsu, T. (Okayama Univ. Med. Sch., Japan). *Brain Nerve (Tokyo)* 25(5):617-622, 1973.

0564 A NEW AND SIMPLIFIED METHOD FOR DETECTING LP-X, A LIPOPROTEIN SPECIFIC FOR CHOLESTASIS. *(Ger.)* Wieland, H.; Seidel, D. (Med. Clin., Univ. Heidelberg, Germany). *Dtsch. Med. Wochenschr.* 98(31):1474-1475, 1973.

0565 TRAUMATIC LIVER CYST. *(E.)* Black, J. E.; Hudson, M. J. (Univ. Otago Med. Sch., Dunedin, New Zealand). *N.Z. Med. J.* 77(492):322-325, 1973.

0566 RECURRENT BENIGN CHOLESTASIS. *(Fr.)* Erlinger, S.; Beaudoin, M.; Benhamou, J. P. (Xavier-Bichat Fac. Med., Paris, France). *Rev. Fr. Gastroenterol.* (8):47-50, 1973.

0567 DEFECTS IN HEPATIC UPTAKE AND TRANSPORT AND BILIARY EXCRETION OF ESTROGENS. SOME NEW CONCEPTS OF LIVER METABOLISM. *(E.)* Adlercreutz, H.; Tikkanen, M. J. (Dept. Clin. Chem., Univ. Helsinki, Finland). *Med. Chir. Dig.* 2(2):59-65, 1973.

See also, 0250, 0254, 0258, 0271, 0273, 0274, 0283, 0284, 0285, 0288, 0290, 0296, 0300, 0301, 0306, 0317, 0321, 0324, 0356, 0400, 0423, 0505, 0639, 0660, 0672, 0688, 0702, 0719, 0724, 0748, 0779, 0785.

Hyperbilirubinemic States

0568 BILE ACID EXCRETION AFTER DISAPPEARANCE OF JAUNDICE IN INTRAHEPATIC CHOLESTASIS OF INFANCY.

(E.) Norman, A.; Strandvik, B. (St. Goran's Hosp. Children, Stockholm, Sweden). *Acta Paediatr. Scand.* 62(3):264-268, 1973.

In 12 cases of intrahepatic cholestasis of infancy the patients were reexamined 1-58 weeks after jaundice disappeared. All infants were clinically healthy, but 4 showed raised SGOT values from 100-158 U/ml and SGPT values from 100-190 U/ml. Cholic acid-24-^{14}C (1-7.5 µCi, i.m.) was administered and the isotope excretion in the urine and feces was subsequently investigated for 4 days. Most of the isotope was excreted in the feces. In 7 infants the urine contained less than 5% of the administered isotope and in the remaining 5 infants, the urine contained 9-26%. No unconjugated labeled cholic acid was excreted. After solvolysis and hydrolysis the major labeled compound was identified as cholic acid. No cholic or chenodeoxycholic acids were detected in the urine of 7 healthy infants used as controls. Cholic and chenodeoxycholic acids were excreted in the urine of all 12 patients at the time of reexamination, the total daily urinary excretion ranging from 0.6-3.7 µm. These results indicate that the bile acid excretion was impaired after regression of jaundice in infants who had had intrahepatic cholestasis.

0569 NEONATAL HYPERBILIRUBINEMIA IN CHINESE.

(E.) Yeung, C. Y. (Queen Elizabeth Hosp., Hong Kong). *Trop. Geogr. Med.* 25(2):151-157, 1973.

Of 1811 Chinese infants (1054 boys and 755 girls) with hyperbilirubinemia, ABO blood group incompatibility without hemolytic anemia was the cause in 414 (22.9%), erythrocyte glucose-6-phosphate dehydrogenase (G6PD) deficiency in 241 (13.4%), immaturity in 65 (3.6%), cephalhematoma in 40 (2%), and pyruvate kinase deficiency in 5 (0.2%). No specific cause could be identified in 1046 cases (57.9%), but 65% of these infants had symptoms suggestive of infections and a large percentage had enlarged livers or spleens. Kernicterus was diagnosed in 156 (8.6%) of the 1811 infants admitted for hyperbilirubinemia, and 31 (20%) of these had evidence of bilirubin encephalopathy at autopsy. In 68% of the infants who died of kernicterus, yellow staining was noted in both the basal nuclei and gray and white matter, which may account for the high incidence of spastic cerebral palsy, rather than classical athetosis and high-tone deafness, in Chinese survivors of kernicterus. The unusually high incidence of nonhemolytic hyperbilirubinemia in Chinese infants may be related to the use of Chinese herbal medicines by the mother in the last weeks of pregnancy. This hypothesis is supported by the relatively low percentage of immature infants with hyperbilirubinemia and the high incidence of hyperbilirubinemia among lower socioeconomic groups who are more likely to use herbal medicines. The latter fact may also be explained by the higher incidence of infections among families of lower socioeconomic status. The most common cause of hemolytic jaundice in these Chinese infants was G6PD deficiency which produced the most severe form of neonatal jaundice. The onset, 2-27 days after birth, was often preceded by exposure to moth balls or Chinese medicines (*Coptis chinensis or japonicum*, ox gallbladder, or thorn rose). The incidence of demonstrable sepsis was also significantly higher in these infants, suggesting a possible causal relation.

0570 USE OF BUCOLOME IN HYPERBILIRUBINEMIA.

(E.) Baba, K. (Nihon Univ., Sch. Med., Tokyo, Japan). *Paediatrician* 1(2):109-111, 1972/73.

Bucolome (5-n-butyl-1-cyclohexyl-2,4,6-trioxoperhydropyridine) was administered p.o. to 25 randomly selected, mature neonates; Coombs-positive infants and those born with asphyxia were excluded. These neonates received 100 mg/day of bucolome in 2 divided doses from day 1 to day 3 of life. Controls consisted of 20 newborns who did not receive the drug. Mean serum bilirubin levels in neonates treated with bucolome were 5.1 and 7.1 mg/100 ml on days 1 and 7, resp., whereas corresponding control bilirubin levels were 5.7 and 11.1 mg/100 ml, resp. Bucolome (600 mg/day, p.o. in 2 divided doses for 4 weeks) was also administered to an 8-yr-old boy with Gilbert's disease who had previously been treated with phenobarital (50 mg/day for 3 weeks). Serum bilirubin levels decreased but glucuronyl transferase activity was normal, which makes it unlikely that bucolome acts by enhancing hepatic glucuronyl transferase in Gilbert's disease. From results obtained in this study and from reports in the literature, it is suggested that bucolome reduces bilirubin levels in neonates by causing an increase in ligandin and/or glucuronyl transferase activity.

0571 PLACE OF PHOTOTHERAPY IN THE TREATMENT OF JAUNDICE IN THE NEWBORN.

(Fr.) Farriaux, J. P.; Wackenier, J. P.; Blanckaert, D.; Hongre, J. F.; Sauvage, R. (Univ. Hosp. Ctr., Lille, France). *Lille Med.* 18(4):403-414, 1973.

The effectiveness of phototherapy was studied in 150 newborns (65 girls and 84 boys) who developed jaundice within the first week after birth. In 52 cases the infants were premature or had a low birth weight. Jaundice was caused by ABO incompatibility in 28 cases and Rh incompatibility in 55; the etiology was unknown in 67 cases. Of these infants, 60 were exposed to blue light and 40 to white light; the remaining 50 were treated by classical methods but received no phototherapy. All treated infants were exposed to light for 24 hr/day for an average of 6 days until serum bilirubin levels decreased below 60 mg/liter. Bilirubin concentrations decreased more rapidly in the 2 groups receiving phototherapy than in controls. No significant differences were noted between the effects of white and blue light. When initial bilirubin values were above 80 mg/liter, more rapid decreases occurred with blue light, particularly in infants with Rh incompatibility. No differences were found between the effects of white and blue light at lower initial bilirubin levels. Phototherapy caused the most rapid decreases in bilirubin when initial levels were above 100 mg/liter. Exchange transfusions were required less often among newborns given phototherapy than among controls. Side effects of phototherapy included anemia, diarrhea, and cutaneous erythema, particularly in newborns exposed to blue light.

0572 DUBIN-JOHNSON SYNDROME. *(Cz.)* Dura, J.; Jindra, J. (Univ. Karlovy Plzni, Czecho-
slovakia). *Vnitr. Lek.* 19(2):165-168, 1973.

0573 TRAUMATIC HEMOBILIA IN A NIGERIAN. *(E.)* Banigo, O. G.; Solanke, T. F.;
Itayemi, S. O. (Univ. Coll. Hosp., Ibadan,
Nigeria). *Am. J. Surg.* 126(4):695-697, 1973.

0574 INVESTIGATIONS OF BLOOD CLOTTING AND FIBRINOLYSIS IN VIABLE NEWBORNS WITH CRITICAL HYPERBILIRUBINEMIA. *(Ger.)* Reddeman, H.; Pietsch, P. (Pediatr. Clin., Ernst Moritz Arndt Univ., Griefswald, Germany). *Zentralbl. Gynaekol.* 95(46):1628-1635, 1973.

See also, 0183, 0509, 0659.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

0575 ACUTE HEPATIC NECROSIS OF HEPATITIS AND MUSHROOM POISONING. THE VALUE OF COAGULA-
TION TESTS IN THEIR DIFFERENTIATION, PROGNOSTIC AS-
ESSMENT AND PATHOGENESIS. *(E.)* Herold, R.;
traub, P. W. (Univ. Med. Clin., Zurich, Switzer-
and). *Helv. Med. Acta* 37(1):5-24, 1973.

he specific factor V assay and the prothrombin com-
lex assay were compared for prognostic evaluation.
lood coagulation and fibrinolysis was assessed in
5 patients (10 female and 5 male; mean age 21.4 yr)
ith severe hepatic failure due to *Amanita phalloides*
oisoning and 15 patients (12 female and 3 male; mean
ge 36.4 yr) with viral hepatitis and comparably low
inimal values for coagulation factors. The extent
r duration of prothrombin-complex depression once
e Quick value was below 30% did not affect the re-
lts. An excessive elevation of factor VIII was
ound during the phase of extreme prothrombin-com-
lex depression in the hepatitis group, but only a
oderate elevation in the group with poisoning. The
rombin time was significantly more prolonged in
e hepatitis group. Rapid depletion of clotting
ctors could not be entirely explained by mere ar-
est of synthesis, or by evidence of disseminated
travascular coagulation. Loss of plasma proteins
om the circulation is proposed as an alternative
chanism. Neither method was shown to be superior
the other.

76 JAUNDICE AFTER MULTIPLE HALOTHANE ANAESTHETICS ADMINISTERED DURING THE TREATMENT
CARCINOMA OF THE UTERUS. *(E.)* Davis, P.; Holds-
rth, C. D. (Roy. Infirm., Sheffield, England).
t 14(7):566-568, 1973.

er a 12-month period, hepatitis developed in 3 of
women with carcinoma of the uterus who received halothane anesthesia on 2 or more occasions. Of the 10 operations performed on these 3 women, aged 51-67 yr, all but 1, a vaginal hysterectomy, were minor. Two of the 3 received radiotherapy, but none had been given any other hepatotoxic drug or blood transfusions or had been exposed to infectious hepatitis. The onset of symptoms was marked by pyrexia 1-7 days after surgery; jaundice developed 2-3 days later and was accompanied by systemic disturbances. Liver function tests were typical of acute hepatic necrosis with a very high initial transaminase value which fell very rapidly, high serum bilirubin levels which fell more slowly, and moderate elevations in serum alkaline phosphatase activity. One patient had eosinophilia. A liver biopsy, performed in 1 case, showed a picture similar to that of acute viral hepatitis. Two of the 3 patients are alive and well 7 and 20 months, resp., after the development of hepatitis; the remaining patient died with renal failure 3 months after discharge. It is recommended that halothane be avoided for repeated frequent anesthesia as may be necessary for treatment of carcinoma of the uterus.

0577 STRUCTURAL AND FUNCTIONAL ABNORMALITIES OF THE LIVER IN PSORIASIS BEFORE AND DURING METHOTREXATE THERAPY. *(E.)* Almeyda, J.; Barnardo, D.; Baker, H.; Levene, G. M.; Landells, J. W. (London Hosp., England). *Br. J. Dermatol.* 87:623-631, 1972.

A study was made of 67 patients (39 males and 28 females, aged 16-77 yr) with severe psoriasis of from 1 to 47 yr duration. Of these 67, 25 were investigated before methotrexate therapy and 42 were examined during or after such therapy. Methotrexate dosage schedules were 2.5 mg p.o. 4 or 5 days/week; 12.5-25 mg p.o. once/week; or 20-40 mg i.m.

or i.v. at weekly or greater intervals. In the 42 patients treated for 3 to 80 months, more histological abnormalities were found than in 25 untreated patients with equally severe psoriasis. Of the treated patients, 3 had cirrhosis, all of whom were heavy drinkers, and 12 had fibrosis. None of the untreated patients had cirrhosis, but 4 had fibrosis. Only the cirrhotic patients showed clinical evidence of hepatic impairment. The incidence of histological abnormality increased with increasing cumulative dosage of methotrexate, but patients on weekly therapy had less abnormality than those on daily oral therapy. Of the 25 untreated patients, 14 were subsequently given the drug once/week for a mean of 23 months. Few additional histological abnormalities developed. In patients with socially and physically crippling psoriasis, the risk of significant hepatic damage through methotrexate therapy is low enough to be acceptable, providing supervision is thorough.

0578 HALOTHANE HEPATITIS: FACT OR FALLACY. *(E.)* Simpson, B. R.; Strunin, L.; Walton, B. (London Hosp., England). *Bull. N.Y. Acad. Med.* 49(8):708-721, 1973.

0579 MORPHOLOGY AND ETIOLOGY OF HALOTHANE-INDUCED LIVER DAMAGE. *(Ger.)* Klinge, O. (Pathol. Inst., Univ. Wurzburg, Germany). *Verh. Dtsch. Ges. Pathol.* 56:548-554, 1972.

0580 CHOLESTATIC JAUNDICE; ORAL CONTRACEPTIVES. *(Sp.)* Bellido, C. A.; Cornejo, E.; Perez, V.; Burucua, J. E. (Natl. Univ. Buenos Aires, Argentina). *Acta Gastroenterol. Latinoam.* 5(2):71-76, 1973.

0581 HALOTHANE INDUCED LIVER DAMAGE. *(E.)* Lund, I.; Skulberg, A. (Ulleval Hosp., Norway). *J. Oslo City Hosp.* 23(10):157-166, 1973.

0582 TOXIC LIVER INJURIES. *(E.)* Kanetaka, T.; Oda, T. (Univ. Tokyo Fac. Med., Japan). *Acta Pathol. Jap.* 23(3):617-627, 1973.

0583 TOXIC HEPATITIS, ESPECIALLY ON THE HEPATIC INJURIES CAUSED BY ACUTE POISONINGS AND CHRONIC ALCOHOLISM IN MEDICAL EXAMINER'S CASES. *(E.)* Okudaira, M. (Med. Examiner's Office, Tokyo, Japan). *Acta Pathol. Jap.* 23(3):629-637, 1973.

0584 ULTRASTRUCTURAL BASIS OF TOXIC HEPATITIS. *(E.)* Onoe, T.; Mori, M. (Sapporo Med. Coll., Japan). *Acta Pathol. Jap.* 23(3):675-681, 1973.

0585 OBSTRUCTIVE JAUNDICE CAUSED BY CHLORPROPAMIDE. *(Sp.)* Bicalho, A. S. (Fac. Med., Minas Gerais Fed. Univ., Belo Horizonte, Brazil). *Arq. Gastroenterol. (Sao Paulo)* 10(2):147-150, 1973.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

0586 HEPATITIS AFFECTING HEMODIALYSIS AND TRANSPLANT PATIENTS: ITS CONSIDERATIONS AND SEQUENCES. *(E.)* Briggs, W. A.; Lazarus, J. M.; Birtch, A. G.; Hampers, C. L.; Hager, E. B.; Merrill, J. P. (Peter Bent Brigham Hosp., Boston, Mass.). *Arch. Intern. Med.* 132(1):21-28, 1973.

From March 1969 through July 1970, hepatitis developed in 14 patients undergoing dialysis, 14 who had received transplants, 9 medical personnel, and 1 patient's spouse. Dialysis patients were usually symptomatic; almost 1/2 were jaundiced, one died of hepatic failure, and persistence of Australia antigenemia was not the rule. The posttransplant patient who had been given immunosuppressants had a benign clinical course compared with both dialysis patients and contact cases. Azathioprine therapy adversely influenced the course of hepatitis in some posttransplant patients, and its temporary discontinuation was associated with rapid clinical and biochemical recovery and with a change from positive to negative test results for Australia antigen in 2 of 4 patients. Chronic Australia antigenemia occurred in 6 posttransplant patients, but only 2 of them had chronic elevation of SGOT X values. Intermittently elevated transaminase values occurred in 3 other posttransplant patients without a positive Australia antigen reaction.

0587 ELEVATION OF FACTOR VIII IN ACUTE LIVER NECROSIS. INFLUENCE OF PLASMAPHERESIS. *(E.)* Baele, G.; Vermeire, P.; Demeulenaere, L.; Barbier, F. (Dept. Internal Med., State Univ. Ghent, Belgium). *Digestion* 8(4):360-367, 1973.

The results of clotting tests during plasmapheresis in 3 female patients (aged 26-46 yr) with acute viral liver necrosis are reported. Elevated antihemophilic globulin (blood coagulation factor VIII) levels were found in all cases before plasmapheresis. During plasmapheresis, a decrease of factor VIII activity occurred in 2 cases. In the 3rd, persistently high factor VIII levels during several days of plasmapheresis suggest that disseminated intravascular coagulation may have been present. Increased synthesis or decreased catabolism of factor VIII must be considered when studying the mechanisms of the elevation of factor VIII in acute viral liver necrosis. Decrease in factor VIII during plasmapheresis may be due to a washout by donor plasma containing normal factor VIII concentrations. The return of factor VIII increased activity after cessation of plasmapheresis would support this suggestion. Extremely high levels of factor VIII may indicate an intense and sustained synthesis.

0588 A MAJOR EPIDEMIC OF INFECTIOUS HEPATITIS IN AN INSTITUTION FOR THE MENTALLY RETARDED.

E.) Matthew, E. B.; Dietzman, D. E.; Madden, D. L.;
Newman, S. J.; Sever, J. L.; Nagler, B.; Bouton, S.
1.; Rostafinski, M. (Infect. Dis. Br., Natl. Inst.
Health, Bethesda, Md.). *Am. J. Epidemiol.*
8(3):199-215, 1973.

he occurrence of 375 clinically manifest cases of
nfectious hepatitis among 3600 mentally retarded pa-
ients over a 6-month period was investigated. Only
employee developed clinically manifest hepatitis
uring the epidemic. The clinical to subclinical
atio of infection was approximately 2:1. The incu-
ation period averaged 29 days. Transmission was
robably from person to person by the fecal-oral
oute through direct contact or through fomites.
ttack rates were high, averaging 57% in a study
roup of 473 severely retarded patients. The attack
ates were low among wards of less retarded patients
no were capable of maintaining better personal hy-
iene. During the epidemic 2 deaths were attributed
hepatitis. Patients over 40 yr old or patients
nstitutionalized at this location for more than 18
had very low attack rates. The epidemic hepa-
itis was not related to the hepatitis B antigen
ustralia antigen). Administration of immune serum
lobulin initially failed to control the epidemic.
tack rates during a period in which no immune serum
obulin was given were similar. A controlled study
te in the epidemic demonstrated the effectiveness
immune serum globulin and the reasons for its
parent initial failure. No index cases were iden-
fied early in the epidemic. Immune serum globulin
s given on the day the first secondary case was
cognized and only prevented clinical disease which
uld have developed after 21 days. Administration
immune serum globulin prior to this proportionally
duced the time period over which secondary cases
re recognized.

39 INCIDENCE OF HEPATITIS AND AUSTRALIA ANTIGENEMIA AMONG LABORATORY WORKERS. *(E.)*

Grippo, G. A.; Hayashi, H. (Henry Ford Hosp.,
troit, Mich.). *Health Lab. Sci.* 10(3):157-162,
73.

uestionnaire survey was made to determine the
idence of hepatitis and Australia antigenemia among laboratory workers. A total of 51 laboratories with 731 personnel in the United States and 38 laboratories with 883 personnel in foreign countries responded. Of the 89 laboratories, 70 were research; 26 clinical; 24 blood bank, 12 renal unit; and 16 performed other functions. Some labs indicated 2 or more functions. The incidence of hepatitis (icteric and anicteric) among workers was 7.4% in the United States and 5.2% for all countries outside the United States. Australia antigenemia among laboratory workers was 2.5% in the United States and 2.7% in foreign countries. The combined rates of 6.2% in clinical hepatitis and 2.6% in Australia antigenemia reported in this survey were higher than those reported among normal populations. Since 16 of the laboratories (18%) conducted no laboratory tests for anicteric hepatitis among their personnel, the incidence of hepatitis could be higher. Of the 89 laboratories 67 (75%) were working with hepatitis-infected materials without inactivation before handling, and 41 of the 89 (46%) indicated no form of decontamination was used after handling infected materials. The survey indicates the need for: periodic examinations of lab personnel employing all available tests for anicteric hepatitis and sterilization of hepatitis-infected materials before and after handling. It is recommended that β-propiolactone and UV irradiation be used for sterilization since they inactivate hepatitis virus without altering the biological activity of Australia antigen.

0590 IMMUNOLOGICAL STUDIES OF AUSTRALIA ANTIGEN CARRIERS WITH AND WITHOUT LIVER DISEASES.

(E.) Nielsen, J. O.; Reinicke, V.; Dietrichson, O.; Andersen, V.; Thomsen, M.; Andersen, E. (Blegdam Hosp., Copenhagen, Denmark). *Clin. Exp. Immunol.* 15(1):9-16, 1973.

The cell-mediated and the humoral immune systems were examined in 2 groups of persistent carriers of Australia (Au) antigen. Group A included 11 blood donors with normal liver histology and without previous history of liver disease. Group B included 7 patients with an initial acute viral hepatitis verified by biopsy. Subsequent biopsies revealed progression to chronic persistent hepatitis in 3 cases, to chronic aggressive hepatitis in 3 and to a suspicion of chronicity in 1. The patients in group B had significantly higher serum concentration of IgM and significantly lower serum concentration of complement C4. No differences were found with respect to the presence of autoantibodies or the antibody response to vaccination with keyhole limpet hemocyanin. Delayed-type cutaneous reactions to 2,4-dinitrochlorobenzene, hemocyanin, and purified protein derivative (PPD) were equal in the 2 groups. The phytohemagglutinin-induced lymphocyte transformation was significantly lower in the group of patients with chronic hepatitis than in the healthy carriers, but none of the groups showed a statistically significant difference from a control group of 8 laboratory technicians. It is concluded that a general immunodeficiency state is not required for developing persistent Au-antigenemia. The slightly impaired T-cell response to PHA found in patients with persistent Au-antigenemia and chronic liver disease may be related to the liver disease rather than to the Au-antigen carrier state.

0591 CELLULAR IMMUNE REACTIONS TO HEPATITIS-ASSOCIATED ANTIGEN (HAA) AND HOMOLOGOUS LIVER-SPECIFIC PROTEIN (HLP) IN ACUTE HAA-POSITIVE HEPATITIS.

(Ger.) Knolle, J.; Meyer zum Buschenfelde, K. H.; Bolte, J. P.; Berger, J. (2nd Med. Clin., Johannes Gutenberg Univ., Mainz, Germany). *Klin. Wochenschr.* 51(23):1172-1174, 1973.

The leukocyte migration test was used to study cell-mediated immune responses to homologous liver-specific antigen (HLP) and hepatitis-associated antigen (HAA) in 51 patients within 3-8 weeks after the onset of HAA-positive acute hepatitis; 46 patients with HAA-negative acute hepatitis and 10 normal subjects served as controls. With HLP as the test antigen, leukocyte migration was inhibited in 13 of 46 patients with HAA-positive hepatitis. When HAA was used, leukocyte migration was inhibited in 21 of 33 patients who had HAA-positive hepatitis in the acute stage but later became HAA-negative; 5 of these patients showed stimulation. In contrast, leukocyte migration with HAA was inhibited in only 5 of 18 HAA-positive patients who became HAA carriers. This difference was statistically significant. Inhibition with both HAA and HLP was observed in only 9 patients. These results indicate that: (1) cellular immune reactions towards HAA occur more frequently in patients who later become HAA-negative; (2) there appears to be no correlation of delayed type immunity against HAA and HLP; and (3) intolerance to HLP can develop in HAA-positive hepatitis. These findings clearly show that hepatitis virus can cause development of autoimmunity.

0592 HEPATIC CIRCULATION IN YOUNG MALES WITH INFECTIOUS HEPATITIS STUDIED AT REST, DURING AND AFTER EXERCISE.

(E.) Lundbergh, P.; Strandell, T. (Roslagstull Hosp., Stockholm, Sweden). *Scand. J. Infect. Dis.* 5(2):155-157, 1973.

Hepatic vein catheterization was performed in 6 males (mean age 25 yr) with Australia antigen-negative infectious hepatitis and 11 healthy male volunteers. Serum bilirubin, SGOT, SGPT, and alkaline phosphatase values were elevated in most patients. At rest in the supine position the total hepatic blood flow estimated by the Bradley technique with indocyanine green was significantly higher in patients than in controls (2.37 and 1.37 liters/min, resp.). During supine bicycle exercise the absolute reduction of the hepatic blood flow was similar in patients and controls, with the patients on a significantly higher flow level. The difference between the wedged and free hepatic venous pressure in patients was 3.1 mm Hg before exercise and 3.8 mm Hg after exercise. The corresponding values for controls were 0.8 and 1.9 mm Hg, resp. The increased hepatic blood flow in patients with hepatitis may be caused by increased hepatic artery blood flow. The high pressures recorded after exercise from a wedged hepatic vein indicate a change in sinusoidal microcirculation which is probably due to a decrease in vascular resistance between the sinusoids and the hepatic artery. This dilatation should be of metabolic origin rather than caused by direct action of the virus. The apparent increase in hepatic artery flow does not rule out the possibility of changes in portal venous flow.

0593 SHIFT IN VIRAL STRAINS OF HEPATITIS B IN STOCKHOLM AS REFLECTED BY SUBTYPES OF HEPATITIS B ANTIGEN.

(E.) Magnius, L.; Berg, R.; Bjorvatn, B.; Svedmyr, A. (Ctr. Microbiol. Lab., Stockholm County Council, Sweden). *Scand. J. Infect. Dis.* 5(2):81-83, 1973.

Subtypes of hepatitis B antigen (HBAg) were determined in 72 patients with acute hepatitis hospitalized in Stockholm 1953-54 and in 202 patients seen during 1970. The relative incidence of HBAg-positive patients was similar in the 2 groups (43 and 49%, resp.). In 1953-54 subtype *ad* was found in 22 of 31 HBAg-positive patients and subtype *ay* in 2 patients. In 1970 only 12 of the 99 HBAg-positive patients had the *ad* subtype, while 75 had the *ay*. All 18 drug addicts among the HBAg-positive patients from 1970 carried the *ay* subtype and so did 90 of 95 HBAg-positive drug addicts attending the outpatient department during 1971-1972. Obviously a shift in predominating subtype has taken place from *ad* in 1953-54 to *ay* in 1970. Since only the *ay* subtypes is found in healthy carriers in Mediterranean countries and the Near and Middle East, it is suggested that tourists or drug addicts returning from these countries may be responsible for the shift in subtype.

0594 HYPOTHESIS TESTING: Gm ANTIGENS AND AUSTRALIA ANTIGEN.

(E.) Schanfield, M. S.; Fudenberg, H. H.; Polesky, H. F.; Perkins, H. A. (Univ. California Med. Ctr., San Francisco). *Nature (New Biol.)* 243(124):81-83, 1973.

Serum specimens from blood donors were classified as to the presence or absence of Australian antigen [Au (1)] and Australian antibody [anti-Au (1)] and typed for Gm allotypic markers. Individuals were considered homozygous for Gm allotypic markers if they were phenotypically Gm(ag), Gm(axg), or Gm(fb) and heterozygous for Gm antigens if they were Gm(agfb) or Gm(axgfb). Among the phenotypically Caucasian donors studied, no association between heterozygosity and homozygosity for Gm allotypic markers and Au(1) status was observed. Antibodies to Gm antigens were only detected when samples being typed for allotypic markers had a positive saline control, since low titers of antibodies to Gm antigens would not be detected by this method. Anti-Gm(a) was detected in 9 individuals, of which 6 were anti-Au-positive (4.2%)

and 3 were Au(1)-positive (1.8%). These findings were not signficantly different from the occurrence of anti-Gm(a) among Au(1)-positive or anti-Au(1)-positive individuals encountered in normal donors. Thus, there is no proven relation to immunization. Obviously, anti-Gm will normally occur in individuals who are homozygous for Gm antigens. Results of this study do not, therefore, support the hypothesis of previous investigations that persistent Au(1) is associated with Gm heterozygosity, while anti-Au(1) is associated with Gm homozygosity or anti-Gm. No significant differences in distribution of Gm phenotypes occurred between individuals with persistent Au(1) or with anti-Au(1), and there was no significant excess of anti-Gm among individuals with anti-Au(1) when compared with those individuals with persistent Au(1). If observations other than these are obtained, it is suggested that they may be due to the use of blood from patients who have received large numbers of transfusions at an early age.

0595 EPIDEMIOLOGY OF HEPATITIS B ANTIGEN IN PANAMA. *(E.)* Peters, C. J.; Reeves, W. C.; Rivera, V.; Johnson, K. M. (Middle America Res. Unit, Canal Zone, Panama). *Am. J. Epidemiol.* 98(4): 301, 1973.

0596 VIRAL HEPATITIS. *(E.)* Grady, G. F. (Univ. Sch. Med., Boston, Mass.). *Adv. Intern. Med.* 18:95-115, 1973.

0597 ON THE DIAGNOSTIC SIGNIFICANCE OF THE HAPTOGLOBINS IN VIRUS HEPATITIS AND OTHER DISEASES OF THE LIVER AND BILIARY TRACTS. *(Ger.)* Jocev, S.; Danceva, M.; Bakalova, R. (Med. Inst. I. P. Pavlov, Plovdiv, Bulgaria). *Folia Med. (Plovdiv)* 14(4):249-257, 1972.

0598 BLEEDING ACCIDENT IN DIALYSIS PATIENTS LEADING TO HEPATITIS OUTBREAK. *(E.)* Kappenberger, L.; Colombi, A.; Locher, G. (Canton Hosp., Lucerne, Switzerland). *Helv. Med. Acta* 37(4):227-234, 1973.

0599 PERSISTENT VIRAL HEPATITIS. *(E.)* Javitt, N. B.; Hand, R.; Finlayson, N. D. C. (New York Hosp. Cornell Med. Ctr., N.Y.). *Am. J. Med.* 55(6):799-810, 1973.

0600 NEW DETERMINANTS OF HEPATITIS B ANTIGEN (Au OR HB ANTIGEN). *(E.)* Soulier, J. P.; Courouce-Pauty, A. M. (Natl. Ctr. Blood Transfusion, Paris, France). *Vox Sang.* 25(3):212-234, 1973.

0601 THE PRESENCE OF HEPATITIS-ASSOCIATED (AUSTRALIA) ANTIGEN IN PERU. *(Sp.)* Pinson, G. G.; Castro, V. M.; (Fac. Med., Natl. Univ. San Marcos, Peru). *Acta Med. Peru* 2(2):107-112, 1973.

See also, 0263, 0268, 0302, 0311, 0313, 0315, 0316, 0720, 0766.

LIVER AND BILIARY TRACT

Chronic Hepatitis

0602 DEPRESSION OF CELL-MEDIATED IMMUNITY IN OLD AGE AND THE IMMUNOPATHIC DISEASES, LUPUS ERYTHEMATOSUS, CHRONIC HEPATITIS AND RHEUMATOID ARTHRITIS. *(E.)* Toh, B. H.; Roberts Thomson, I. C.; lathews, J. D.; Whittingham, S.; Mackay, I. R. (Walter and Eliza Hall Inst. Med. Res., Melbourne, ustralia). *Clin. Exp. Immunol.* 14(2):193-202, 1973.

Cell-mediated immune response was studied by delayed ypersensitivity reactions to 5 antigens (*Candida*, umps, trichophyton, tuberculin, and streptokinase-treptodornase) injected intradermally and by lymphocyte transformation and humoral immune response was tudied by response to flagellin in 24 patients (18 omen and 6 men, aged 18-75 yr) with active chronic hepatitis and in 44 controls. At the time of testing, 7 of the patients with hepatitis were receiving prednisolone (5-20 mg/day) alone, 4 were receiving prednisolone (5-10 mg/day) + azathioprine (50-100 mg/day), and 1 was receiving cyclophosphamide (100 mg/day); 12 were not receiving drug treatment. The response of these patients to all 5 antigens was poor: a total of only 27 responses were recorded compared to 148 in the controls. Prednisolone had no effect on the number of positive reactions, but there were significantly fewer responses in patients given prednisolone + azathioprine. *In vitro* transformation of lymphocytes, both in unstimulated cultures and cultures stimulated with 100 μg of phytohemagglutinin, was significantly depressed in patients with chronic hepatitis. Weak delayed hypersensitivity responses were associated significantly with low titers of natural antibody to flagellin and with lower humoral immune responses to flagellin.

0603 CYTOPLASMIC FUSIONS BETWEEN LIVER PARENCHYMAL CELLS AND INFILTRATING CELLS IN CHRONIC AGGRESSIVE HEPATITIS.

(E.) Bassewitz, D. B.; Roessner, A.; Nauta, R.; Themann, H. (Dept. Med. Ultrastruct. Res., Westphalian Wilhelms Univ., Munster, Germany). *Virchows Arch.* [*Pathol. Anat.*] 359(4):309-313, 1973.

Lymphocytes and plasma cells have been demonstrated in the peripheral zones of lobules in 15 liver biopsies from patients with chronic aggressive hepatitis. In the region of contact between lymphocytes and parenchymal cells, the cell membranes were frequently not demonstrable, suggesting cytoplasmic fusion. However, when the goniometer is used, the cell membranes in this region can still be demonstrated at a certain tilt angle with respect to the electron beam. It is concluded that the presumed cytoplasmic fusions are frequently the result of superposition effects in projection.

0604 MEMBRANO-PROLIFERATIVE GLOMERULONEPHRITIS ASSOCIATED WITH PERSISTENT VIRAL HEPATITIS.

(E.) Myers, B. D.; Griffel, B.; Naveh, D.; Jankielowitz, T.; Klajman, A. (Meir Hosp., Kjar Saba, Israel). *Am. J. Clin. Pathol.* 60(2):222-228, 1973.

A 30-yr-old female had persistent viral hepatitis with chronic glomerulonephritis for 6 yr, the illness originally occurring during her first pregnancy. Following termination of the third pregnancy, she had marked hypertension, with exudate and hemorrhagic retinopathy, striking hepatomegaly, and moderate pitting pedal edema. Serum bilirubin was 0.5 mg/100 ml; SGOT, 10-20 U; and serum alkaline phosphatase, 24 I.U. The clinical picture was hematuria and nephrotic syndrome associated with hypertension and progressive renal failure prominent over the entire course of the disease. Electron microscopy showed mesangial hyperplasia with interposition of mesangial cytoplasm between endothelium and glomerular basement membrane. Kidney sections, when stained for IgG, serum complement component C'3, and Australian antigen (Au) in immunofluorescence tests, showed granular irregular deposits in the glomerular capillary loops, most pronounced at the periphery of the loops. A granular fluorescence was also observed in the mesangium when stained for Au and C'3. Serum complement components C'3 and C'4 could be detected in trace amounts only in the patient's serum using the Mancini radial immunodiffusion method in plates. It is suggested that immune complexes containing hepatitis virus are involved in producing glomerulonephritis and that a variety of pathologic glomerular responses may be evoked.

0605 THE INCIDENCE OF OXYPHENISATIN INGESTION IN ACTIVE CHRONIC HEPATITIS: A PROSPECTIVE CONTROLLED STUDY OF 29 PATIENTS.

(E.) Cooksley, W. G. E.; Cowen, A. E.; Powell, L. W. (Dept. Med., Univ. Queensland, Brisbane, Australia). *Aust. N.Z. J. Med.* 3(2):124-128, 1973.

A detailed inquiry was made into the laxative habits of 29 patients (22 females and 7 males) with active chronic hepatitis and a control group. In 5 of the 12 females over 30 yr old with active chronic hepatitis, regular oxyphenisatin ingestion was reported. This was highly significant when compared with 36 matched controls, 9 of whom regularly ingested laxatives, none of which contained oxyphenisatin. Also, in 2 of the patients who were challenged with the drug, an abrupt elevation in the serum bilirubin, and SGOT occurred within 24 hr of ingestion of a single tablet. Australia antigen was detected in the serum of only 1 patient. The results support an etiological role of oxyphenisatin ingestion in some patients with active chronic hepatitits, thus validating the action of the Australian Drug Evaluation Committee who recently withdrew the drug from the Australian market. Furthermore, the study demonstrated the predilection for middle-aged female patients.

0606 A POSSIBLE RELATIONSHIP TO TREATMENT BETWEEN HEPATITIS-ASSOCIATED ANTIGEN AND CHRONIC PERSISTENT HEPATITIS IN HODGKIN'S DISEASE.

(E.) Grange, M. J.; Erlinger, S.; Teillet, F.; Schlegel, N.; Barge, J.; Degott, C. (Beaujon Hosp., Clichy, France). *Gut* 14(6):433-437, 1973.

Hepatitis-associated (Australia) antigen (HAA) was detected in the sera of 16 (50%) of 33 patients with Hodgkin's disease; all of the patients had received the same treatment for approximately 2 yr, and had been in complete remission for at least 2 yr. The HAA-positive patients had significantly higher levels of serum SGPT (48 milliunits/ml compared with 18 milliunits/ml for negative patients) and significantly lower BSP clearance (0.10 compared with 0.13 for negative patients). Histological changes compatible with a diagnosis of chronic persistent hepatitis were found in the liver biopsies of 12 of the 16 HAA-positive patients and 5 of the 17 HAA-nagative patients. In 128 patients with Hodgkin's disease who have received various forms of treatment and who were studied at various stages of remission, HAA was found in the sera of 42 (33%). Tests for HAA repeated 4 months later in positive reactors of both groups showed persisting antigenemia. HAA was not present in the sera of any of 36 patients with Hodgkin's disease studied when the diagnosis was first made and before treatment had begun. These observations suggest that persistence of HAA and the presence of chronic persistent hepatitis were related to the treatment the patients had received rather than to the disease itself. A plausible hypothesis is that the acquisition and persistence of HAA are the result of treatment-induced impairment in the cell-mediated immune response.

0607 AUSTRALIA-ANTIGEN IN CHRONIC HEPATIC PATHOLOGY. *(Fr.)* Bondue, H. (Ixelles Hosp., Brussels, Belgium). *Acta Gastroenterol. Belg.* 36(6):282-301, 1973.

0608 THE PROBLEMS OF CHRONIC HEPATITIS IN CHILDREN. *(Czech.)* Brachfeldova, J.; Korrova, V.; Lyer, J.; Hasuka, V. (Fac. Pediatr. Med., Charles Univ., Prague, Czechoslovakia). *Cesk. Pediatr.* 28(9):467-470, 1973.

See also, 0163, 0590.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

0609 MESTEROLONE IN STEATOSIS AND CIRRHOSIS OF THE LIVER. *(E.)* Figueroa, R. B. (Inst. Invest. Clin., Universidad Nacional Mayor de San Marcos, Lima Peru). *Acta Hepatogastroenterol.* 20(4): 282-290, 1973.

Conventional liver therapy was conducted for 3-6 months in 33 chronic alcoholics (32 males and 1 female, aged 18-66 yr) and 16 nonalcoholics (8 male and 8 female, aged 25-51 yr) with chronic active liver disease. Of the 33 alcoholics, 11 had liver steatosis, 9 had liver steatosis and cirrhosis, and 13 had decompensated liver cirrhosis. In the nonalcoholic group, 14 patients and posthepatic cirrhosis, 1 had steatosis and hepatic granulomatosis, and 1 had tuberculosis and steatosis. Of the 49 patients, 30 received mesterolone (75 mg/day for 3 months) in addition to conventional therapy consisting of absolute banning of alcohol, bed rest for the first month, balanced diet, vitamin C (2 x 500 mg/day), and vitamin B complex (2 capsules/day) for 3-6 months. Results of the treatments showed that the clinical findings and liver function tests had improved to a much greater extent in the group receiving supplementary treatment with mesterolone. The improvement was particularly marked in patients with liver steatosis and those with liver steatosis and compensated liver cirrhosis. In both the alcoholic and nonalcoholic groups, an impressive improvement in general welfare was noted among those receiving mesterolone. The effect of mesterolone was poor in decompensated liver cirrhosis, due at least in part to the short duration of the treatment. No side effects were observed.

0610 PREDNISONE THERAPY OF ACUTE ALCOHOLIC HEPATITIS: REPORT OF A CONTROLLED TRIAL. *(E.)* Campra, J. L.; Hamlin, Jr., E. M.; Kirshbaum, R. J.; Olivier, M.; Redeker, A. G.; Reynolds, T. B. (Univ. Southern California Sch. Med., Los Angeles). *Ann. Intern. Med.* 79(5):625-631, 1973.

Of 45 hospitalized patients (aged 21-63 yr) with severe acute alcoholic hepatitis, 20 received prednisone therapy (0.5 mg/kg/day for 3 weeks and then 0.25 mg/kg/day for an additional 3 weeks). The remaining 25 patients served as controls. Mortality was 36% of prednisone-treated patients and 35% in controls. All deaths resulted from progressive hepatic failure, alone or in association with gastrointestinal bleeding or functional renal failure. The prednisone and control groups did not differ in duration of hospitalization, appetite, strength, rate of ambulation, or rate of improvement in serum bilirubin, SGOT, or prothrombin time. Serum albumin levels increased to a greater extent in the prednisone group, but this is attributed to a nonspecific effect of corticosteroid on albumin synthesis. Although the difference was not statistically significant, encephalopathic patients treated with prednisone survived longer than those in the control group. Although prednisone failed to induce any significant change in the clinical course of acute alcoholic hepatitis, further investigations may be justified to determine whether prednisone benefits patients who also have hepatic encephalopathy.

0611 MORPHOMETRIC STUDY OF THE ULTRASTRUCTURE OF HUMAN ALCOHOLIC FATTY LIVER. *(E.)* Oudea, M. C.; Collette, M.; Dedieu, P.; Oudea, P. (Hotel Dieu, Nantes, France). *Biomedicine* 19(10): 455-459, 1973.

Liver ultrastructure in 5 chronic alcoholics (males, aged 36-52 yr) without cirrhosis or liver cell necrosis was studied by a morphometric method. These subjects had consumed 100-250 g of ethanol/day for 10-20 yr, mainly as wine or beer. Comparison with liver tissue samples from 5 abstinent controls (males, aged 27-45 yr) showed a 34-fold increase in the volume density of fat droplets and a 20% increase in smooth endoplasmic reticulum surface density in alcoholics. The rough endoplasmic reticulum was unaltered. Mitochondrial volume density was increased (+23%) only when referred to fat-free cytoplasm unit volume, and there was no indication of increased mitochondrial mean volume. These results suggest that conspicuous mitochondrial alterations, such as those reported for severe forms of alcoholic hepatitis, are not found consistently in chronic alcoholism.

0612 ALCOHOLIC HEPATITIS AND CORTICOSTEROIDS. *(E.)* Leevy, C. M.; Zetterman, R. (Coll. Med. Dent. New Jersey, Newark). *Ann. Intern. Med.* 79(5):739-740, 1973.

0613 HEPATIC AND METABOLIC EFFECTS OF ALCOHOL. (1966 TO 1973). *(E.)* Lieber, C. S. (Bronx VA Hosp., N.Y.). *Gastroenterology* 65(5): 821-846, 1973.

See also, 0166, 0548, 0615, 0620.

LIVER AND BILIARY TRACT

Cirrhosis

0614 PHYTOHAEMAGGLUTININ (PHA) INDUCED LYMPHOCYTE TRANSFORMATION AND TOXOPLASMA GONDII ANTIBODY STUDIES IN PRIMARY BILIARY CIRRHOSIS. EVIDENCE OF IMPAIRED CELL-MEDIATED IMMUNITY. *(E.)* MacSween, R. N. M.; Galbraith, I.; Thomas, M. A.; Watkinson, G.; Ludlam, G. B. (Western Infirm., Glasgow, Scotland). *Clin. Exp. Immunol.* 15(1):35-42, 1973.

Phytohemagglutinin induced dose-response lymphocyte transformation has been studied in 18 patients (17 female and 1 male; aged 30-71 yr) with primary biliary cirrhosis of from 1 to 11 yr duration. There was a marked reduction in responsiveness, particularly with low doses of phytohemagglutinin. These observations, together with the finding of a raised incidence (7%) of high titer *Toxoplasma gondii* antibody in primary biliary cirrhosis patients, are seen as evidence of impaired cell-mediated immunity in this disease. Results obtained in this study clearly show that *Toxoplasma* is not causally related to primary biliary cirrhosis.

0615 ANTIBODIES TO ESCHERICHIA COLI IN ALCOHOLIC AND NON-ALCOHOLIC PATIENTS WITH CIRRHOSIS OF THE LIVER OR FATTY LIVER. *(E.)* Prytz, H.; Bjorneboe, M.; Orskov, F.; Hilden, M. (Bispebjerg Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 8(5):433-438, 1973.

Agglutinin titrations were carried out on sera from 4 groups of patients with *Escherichia coli* O-groups. The patients consisted of 81 cirrhotics (37 alcoholics and 44 non-alcoholics), 16 with fatty liver (8 alcoholics and 8 non-alcoholics), 9 chronic alcoholics without liver disease, and 26 controls. Increased titers of antibodies to *E. coli* were found in liver cirrhosis and fatty liver: higher titers were found in cirrhosis. Higher titers of antibodies were found in alcoholic than in non-alcoholic liver disease. Differences in the immunoinhibiting ability of the liver in alcoholic and non-alcoholic liver disease may account for differences in the titers of *E. coli* antibodies. The increased frequency of *E. coli* infections in patients with cirrhosis may be due to functional defects in the reticuloendothelial system or to increased antigenicity of bacterial flora in the intestine.

0616 HYPERFIBRINOLYSIS IN CIRRHOSIS. *(E.)* Pises, P.; Bick, R.; Siegel, B. (Dept. Med., Univ. California, Los Angeles). *Am. J. Gastroenterol.* 60(3):280-289, 1973.

Bleeding esophageal varices were studied in 20 cases (17 male and 3 female, aged 31-60 yr) for coagulation factors, coagulation process, and fibrinolytic state. Evidence of hyperfibrinolysis was seen in 5 cases, as measured by active plasmin in 3 and protamine screening in 2. The failure of hepatic clearance of fibrinolytic activators, decreased or abnormal antifibrinolytic factors, or increases in tissue fibrinolytic activity must be considered as possible mechanisms for the pathogenesis of hyperfibrinolysis in cirrhosis.

0617 FACTORS AFFECTING PLASMA CLEARANCE OF [^{14}C] CHOLIC ACID IN PATIENTS WITH CIRRHOSIS. *(E.)* Kaye, M. D.; Struthers, Jr., F. E.; Tidball, J. S.; DeNiro, E.; Kern, Jr., F. (Univ. Colorado Sch. Med., Denver). *Clin. Sci. Mol. Med.* 45(2):147-161, 1973.

Clearance of ^{14}C-labeled cholic acid from the systemic circulation was studied in 6 normal subjects and patients with biopsy-proven primary biliary cirrhosis (1 case), postnecrotic cirrhosis (2 cases), and portal cirrhosis (5 cases). These 8 cirrhotics consisted of 5 men and 3 women, aged 25-65 yr. During fasting, the curve for disappearance of radioactivity from the serum was double-exponential in form during the first 100 min in both groups after ^{14}C-labeled cholic acid injection. During the early phase, cholic acid clearance was significantly more rapid and concentrations of conjugated and free bile were significantly lower in controls than in cirrhotics. Within 3 hr radioactivity had disappeared from the systemic circulation of controls, and neither i.v. cholecystokinin nor food ingestion had any effect on serum radioactivity. In contrast, radioactivity persisted in the serum of cirrhotics for at least 5 hr and, in 4 cases, for 24 hr. Of the 8 cirrhotics, 6 had "spontaneous" rises in serum radioactivity which began about 2 hr after ^{14}C-labeled cholic acid injection. Cholecystokinin or food given 4-8 hr after administration of cholic acid increased serum radioactivity as did reinfusion of duodenal juice into the upper intestine. Continuous aspiration of duodenal juice significantly reduced these rises. All rises occurred almost exclusively because of rises in conjugated bile acids. In cirrhotics, impaired bile acid clearance may result from inefficient hepatic extraction of bile acids, increased leakage of conjugated bile acids from hepatic cells, and shunting from portal to systemic circulation. The latter factor is probably responsible for elevated, fluctuating plasma bile acid concentrations in cirrhotics.

0618 AUSTRALIA ANTIGEN AND PRIMARY BILIARY CIRRHOSIS. *(E.)* MacSween, R. N. M.; Yeung Laiwah, A. A. C.; Busuttil, A. A.; Thomas, M. A.; Ross, S. K.; Watkinson, G.; Millman, I.; Blumberg, B. S. (Western Infirm., Glasgow, Scotland). *J. Clin. Pathol.* 26(5):335-339, 1973.

Sera from 64 patients (59 women and 5 men, aged 30-78 yr) with primary biliary cirrhosis were all negative for Australia (Au) antigen on immunodiffusion and immunoelectrophoresis. However, Au antigen was detected in sera from 10 patients (15.6%) but in only 2 (3.1%) of 64 age- and sex-matched controls by a radioimmunoprecipitation technique; this difference is highly significant. Of the 10 Au antigen-positive patients with biliary cirrhosis, 2 had received blood transfusions, 2 had undergone surgery, but the remaining 6 had no relevant history about a possible source of infection. Neither of the 2 controls had a history of jaundice or blood transfusions, and both had normal liver function tests. However, both had nursed family members with jaundice. Although radioimmunoprecipitation could be measuring some nonspecific blood constituent present in patients with primary biliary cirrhosis but not in controls, the higher incidence of Au antigen in biliary cirrhosis might mean that: (1) the antigen is involved in the genesis of this disease, (2) the disease is a result of antigen-antibody complex formation, (3) biliary cirrhosis is a disease which impairs immunity to viral hepatitis, or (4) the radioimmunoassay technique employed detects host material antigenically related to Au antigen. The radioimmunoassay also detected Au antibodies in sera from 6 patients (9.4%) and 5 controls (7.8%). Lymphocytes from 1 of 24 patients with primary biliary cirrhosis underwent transformation on stimulation with a serum rich in Au antigen. Failure to show delayed hypersensitivity to Au antigen in biliary cirrhosis could be a manifestation of the impairment of cellular immunity and could offer an explanation for apparent persistence of the virus in some cases.

0619 THE PRIMARY IMMUNE RESPONSE TO HAEMOCYANIN IN PATIENTS WITH PRIMARY BILIARY CIRRHOSIS. *(E.)* Fox, R. A.; Dudley, F. J.; Sherlock, S. (Roy. Free Hosp., London, England). *Clin. Exp. Immunol.* 14(4):473-480, 1973.

Both the humoral and cellular immune response to hemocyanin was measured in normal subjects and patients with liver disease including primary biliary cirrhosis (20 females and 2 males, aged 43-68 yr), other forms of cholestasis (biliary calculi, stricture, or neoplasm; 8 females and 2 males, aged 33-74 yr), and cryptogenic cirrhosis (15 females and 12 males, aged 14-65 yr). A sensitizing dose of 5 mg hemocyanin, injected s.c. in the right forearm, was followed on day 5 by intradermal injection of 100 μg hemocyanin in the left forearm. Significant differences in antibody titer were found 2 weeks after immunization and were highest in normal subjects, less in cryptogenic cirrhosis, and least in primary biliary cirrhosis.
The incidence of positive skin tests, indicating the development of delayed hypersensitivity to hemocyanin, was significantly less in patients with primary biliary cirrhosis and cryptogenic cirrhosis than in those with cholestasis or the normal subjects. It is suggested that the poor antibody response seen in primary biliary cirrhosis, could be related to impaired T cell function and hence lack of the T and B cell cooperation necessary for antibody formation to some antigens. The presence of delayed hypersensitivity to hemocyanin as measured by the skin test was compared to other tests of delayed hypersensitivity including the tuberculin skin test, dinitrochlorobenzene sensitization, and phytohemagglutinin-stimulated *in vitro* lymphocyte transformation. Of 20 patients with primary biliary cirrhosis the results of all 4 tests correlated in 9 but did not agree in the remaining 11. The importance of using a number of indices when assessing the degree of anergy of any one patient is evident.

0620 DYSCHROMATOPSIA WITH HEPATIC CIRRHOSIS: RELATION TO SERUM B_{12} AND FOLIC ACID. *(E.)* Rothstein, T. B.; Shapiro, M. W.; Sacks, J. G.; Weis, M. J. (Northwestern Univ. Med. Sch., Chicago, Ill.). *Am. J. Ophthalmol.* 75(5):889-894, 1973.

Laennec's cirrhosis was confirmed by liver biopsy in 16 male patients, aged 36-65 yr, who were subsequently evaluated for acquired dyschromatopsias, using the Farnsworth-Munsell 100-Hue Test. All subjects had histories of prolonged chronic ethanol intake and averaged 1 1/2 packs of cigarettes/day All patients with neurological symptoms associated with liver disease and/or alcoholism, those with a personal or family history of color blindness, those with ocular pathology, and those whose vision could not be corrected to 20/20 were excluded from this investigation. Of these cirrhotic subjects 88% had significant defects in color vision as compared to normal, healthy controls. No relation could be established between serum B_{12} levels and error score on the Farnsworth Munsell 100-Hue Test. However, 69% of the patients had abnormally low serum folic acid levels. Of these, 82% had error scores significantly different from the mean of the control population. Low serum folic acid levels may bear some relation to these acquired color-vision deficits. Decreased visual acuity need not precede defects in color vision as manifested on the Farnsworth-Munsell 100-Hue Test. If folic acid is a factor causing acquired dyschromatopsias, the results of this study indicate the deficit is not completely reversible.

0621 ENDOGENOUS INHIBITORS OF FIBRINOLYSIS IN CIRRHOSIS. *(Ger.)* Aschauer, R.; Holzknecht, F.; Platzer, S. (Med. Clin., Univ. Innsbruck, Austria). *Klin. Wochenschr.* 51(23):1170-1172, 1973.

Significant increases in α_2-macroglobulin and α_1-antitrypsin levels were found in 22 patients (16 men and 6 women) with cirrhosis. These increases were still evident when female patients and 6 patients receiving corticosteroids were excluded. Significant increases were also found in plasma urokinase inhibitor. After inhibitors of fibrinolysis had been removed, *in vitro* studies demonstrated that fibrinolysis was increased. Plasminogen activator was significantly increased, but plasminogen levels were significantly decreased. An increase in fibrinogen-fibrin degradation products provides further evidence of fibrinolysis activation. However, with the methods employed it could not be established whether this was caused by fibrinogenolysis or fibrinolysis, but the findings could be explained, at least partially, by impairment of the liver's ability to clear these products. Decreases occurred in antithrombin III, but it is not clear whether this is due to impaired synthesis or increased consumption. These findings do not rule out the possibility that endogenous fibrinolytic activity is inhibited in advanced cirrhosis by increases in inhibitors (α_2-macroglobulin, α_1-antitrypsin, urokinase inhibitor) although fibrinolytic activity is increased *in vitro* in a test system from which inhibitors have been removed. No explanation was found for the tendency to thrombus formation in cirrhosis.

0622 PLASMA VISCOSITY AND PORTAL HYPERTENSION IN PATIENTS WITH CIRRHOSIS. *(Ger.)* Leonhardt, H.; Bungert, H. J. (Steglitz Clin., Free Univ., Berlin, Germany). *Klin. Wochenschr.* 51(21):1043-1049, 1973.

Determinations of plasma viscosity, total protein, immunoglobulins, fibrinogen, cholinesterase, glutamate dehydrogenase, and γ-glutamyl transpeptidase were made on 32 patients (24 men and 8 women, aged 22-72 yr) with cirrhosis confirmed by laparoscopy and biopsy. All patients were evaluated for portal hypertension and esophageal varices. High plasma viscosity values were found in patients at the onset of portal hypertension, whereas low viscosity values were found in those with pronounced collateral circulation and esophageal varices. High plasma viscosity was most frequently associated with increases in IgG, while low plasma viscosity was associated with decreases in plasma fibrinogen concentrations. It is considered that these low viscosity values are causally related to decreases in plasma fibrinogen values, no matter whether the latter result from a latent intravascular coagulation or hyperfibrinolysis. Although it is not known whether disturbances in the synthesis of clotting factors by the liver also play a role, cholinesterase values, which are an indirect criterion of synthesis, were significantly decreased in all patients with cirrhosis, particularly in those with esophageal varices. Glutamate dehydrogenase and γ-glutamyl transpeptidase activities were increased, particularly in patients with portal hypertension and no varices.

0623 COMPARISON OF THE EFFECT OF VARIOUS AMINO ACIDS UPON THE BLOOD AMMONIA CONCENTRATION OF PATIENTS WITH LIVER DISEASE. *(E.)* Rudman, D.; Galambos, J. T.; Smith, III, R. B.; Salam, A. A.; Warren, W. D. (Emory Univ. Sch. Med., Atlanta, Ga.) *Am. J. Clin. Nutr.* 26(9):916-925, 1973.

The effect of 18 amino acids and urea on blood ammonia concentration was measured in 6 cirrhotic patients (5 males and 1 female, aged 34-62 yr) with Laennec's cirrhosis (5) or postnecrotic cirrhosis (1) and with a history of hepatic encephalopathy. Similar measurements were made on 9 normal subjects (aged 24-29 yr). Blood ammonia was determined before and at 2, 4, and 6 hr after ingestion of test material. Each preparation was tested at doses representing 0.00088 to 0.45 g N/kg body weight$^{3/4}$. Of the 18 amino acids, 10 increased blood ammonia, maximizing at 4 hr. The minimal effective dose of each amino acid elevating blood ammonia by 50 or 100 μg/100 ml at 4 hr was determined. Glycine was assigned an ammonigenic potency of 100. The 18 amino acids and urea were then ranked in three groups: potency 40 to 160, glycine, serine, threonine, glutamine, histidine, lysine, and asparagine; potency 9 to 25, leucine, alanine, valine, phenylalanine, isoleucine, tyrosine, and proline; and potency less than 7, arginine, aspartic acid, glutamic acid, tryptophan, and urea. The high potency of the first group may reflect the production of ammonia in the initial reaction of metabolic degradation (deamination or deamidation). The low potency of the other groups may be due to catabolism proceeding initially via transamination, with the amino groups entering the Krebs-Henseleit cycle via aspartic acid rather than ammonia. The hypothesis was supported by failure of neomycin to alter the oral ammonigenic protencies of glycine, serine, lysine, phenylalanine, leucine, and alanine; and by the appearance of a similar order of ammonigenic potencies for glycine, serine, threonine, glutamine, valine, phenylalanine, arginine, glutamic acid, and aspartic acid, whether tested by the p.o. or i.v. route.

0624 LATE RESULTS OF ELECTIVE AND EMERGENCY PORTACAVAL ANASTOMOSIS. WITH PARTICULAR REFERENCE TO THE TYPE OF STOMA USED. *(E.)* Keighley,

M. R. B.; Ionescu, M. I.; Wooler, G. H. (Gen. Infirm., Leeds, England). *Am. J. Surg.* 126(4):601-605, 1973.

0625 ON THE PROGNOSTIC SIGNIFICANCE OF THE INDEX LIVER-SPLEEN ACTIVITY--COLLOIDAL RADIOACTIVE GOLD--^{198}AU IN THE SCINTIGRAPHIC EXAMINATION OF PATIENTS WITH HEPATIC CIRRHOSIS. *(E.)* Mincev, M.; Uzunov, I. (I. P. Pavlov Higher Med. Inst. Plovdiv, Bulgaria). *Folia Med. (Plovdiv)* 14(4):241-247, 1972.

0626 INVESTIGATION OF THE FUNCTIONAL STATE OF THE LIVER BY MEANS OF ^{131}I-BENGAL PINK IN PATIENTS WITH CIRRHOSIS OF THE LIVER. *(E.)* Zaharieva, Z.; Mincev, M. (I. P. Pavlov Higher Med. Inst., Plovdiv, Bulgaria). *Folia Med. (Plovdiv)* 15(1):11-16, 1973.

0627 ERYTHROCYTE 2,3-DIPHOSPHOGLUCERATE RESPONSE TO OPERATION IN PATIENTS WITH CIRRHOSIS. *(E.)* Johnson, G.; Proctor, H. J.; Proctor, Parker, J. C. (Univ. North Carolina Med. Sch., Chapel Hill). *J. Surg. Res.* 15(5):371-374, 1973.

0628 CIRRHOSIS IN CHILDHOOD. *(Sp.)* Emiliani, R. A.; Jaureguiberry, J. C. (no affil.). *Acta Gastroenterol. Latinoam.* 5(2):95-107, 1973.

0629 PULMONARY ARTERIO-VENOUS SHORT-CIRCUITS AND LIVER CIRRHOSIS. *(Fr.)* Michel, F. B.; Rousset, G.; Grolleau-Raoux, R.; Michel, H.; Baldet, P.; Vidal, J. (no affil.). *Poumon Coeur* 29(1):57-65, 1973.

See also, 0186, 0264, 0289, 0548.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

0630 SEX DIFFERENCES IN THE BILE ACID COMPOSITION OF HUMAN BILE: STUDIES IN PATIENTS WITH AND WITHOUT GALLSTONES. *(E.)* Fisher, M. M.; Yousef, I. M. (Dept. Med., Univ. Toronto, Canada). *Can. Med. Assoc. J.* 109(3):190-193, 1973.

The bile acid composition of human gallbladder bile was studied in 83 subjects (aged 20-75 yr). Of these 83 patients, 40 (20 males and 20 females) had no discernible hepatobiliary disease, and 20 men and 23 women had cholelithiasis. Of the 40 subjects with no discernible hepatobiliary disease, 25 had peptic ulcers and 9 had hiatus hernias. Bile acids were measured by combined thin-layer and gas-liquid chromatography. In the bile of patients without cholelithiasis the molar percent of cholic acid was significantly greater in men (52.69 vs. 33.44) while that of chenodeoxycholic acid was significantly greater in women (46.92 vs. 32.98). In the bile of patients with cholelithiasis the concentration of total bile acids was reduced in both sexes but there was no sex difference in the molar percent of any of the bile acids. The molar percent of chenodeoxycholic acid (both glycine and taurine conjugates) was reduced in women, while the molar percent of cholic acid (only the glycine conjugate) as reduced in men. Total lipids and total bile cids were very significantly decreased in lithogenc bile from both men and women. These findings suggest that there is a characteristic bile acid pattern in gallbladder bile from patients with cholelithiasis and that each sex has its own pattern.

0631 LONG-TERM RESULTS OF ROUX-EN-Y HEPATOCHOLANGIOJEJUNOSTOMY. *(E.)* Lane, C. E.; Sawyers, J. L.; Riddell, D. H.; Scott, Jr., H. W. (Vanderbilt Univ. Med. Ctr., Nashville, Tenn.). *Ann. Surg.* 177(6):714-722, 1973.

Hepatocholangiojejunostomy with a Roux-en-Y jejunal segment and the "fish-mouth" technique of managing the proximal hepatic duct was performed on 22 patients (14 women, 7 men, and 1 infant, aged 3.5 months to 80 yr) with high strictures of the hepatic bile duct. These patients have been followed for as long as 20 yr. In 17 cases the high stricture occurred after cholecystectomy. Of these 17 patients, 7 had concomitant common bile duct explorations while 10 had undergone only cholecystectomy. Thus, 80% of the patients apparently developed bile duct strictures from an injury sustained during a previous operation. Previous unsuccessful attempts to repair a bile duct stricture had been made in 12 patients. Recurrences had developed after end-to-end bile duct anastomoses (5 cases), plastic revisions of the common bile duct (4 cases), and choledochojejunostomy (3 cases). Two patients had undergone 4 previous operations each, and 2 patients had each had 7 previous attempts at repair of their stricture. Hepatocholangiojejunostomy gave acceptable results in 16 patients (73%). There was 1 postoperative death from peritonitis, gastrointestinal bleeding, and generalized sepsis. Reoperation was necessary in 5 patients (23%) who developed recurrent strictures. Other complications included upper gastrointestinal bleeding from stress ulcers (2 cases) and esophageal varices secondary to portal hypertension caused by biliary cirrhosis (2 cases); hepatic failure (1 case); cholangitis (5 cases); and subhepatic abscess (1 case). It is concluded that hepatocholangiojejunostomy is an effective operation for treatment of benign hepatic duct stricture when a mucosa-to-mucosa anastomosis either cannot be made or fails.

0632 MAN-MADE GALLSTONES: A NEW ENTITY FOLLOWING CARDIAC VALVE REPLACEMENT. *(E.)* Merendino, K. A.; Manhas, D. R. (Univ. Washington Sch. Med., Seattle). *Ann. Surg.* 177(6):694-704, 1973.

Mitral regurgitation secondary to rheumatic fever necessitated valve replacement in a 32-yr-old man. Postoperative jaundice and anemia developed with hepatosplenomegaly and lymphocytosis. Hemolytic anemia and hepatitis secondary to blood transfusion were considered responsible, but no evidence was found to support the latter diagnosis. Recurrent frequent attacks of cholecystitis developed, and gallstones were found. Persistent hemolysis plus mitral regurgitation forced replacement of the Gott valve. Subsequently, all evidence of significant hemolysis disappeared. The finding of 2 additional patients with similar histories initiated a study of the incidence of gallstones in patients with cardiac valve replacement. In 39 patients (31 men and 8 women, aged 21-66 yr) who had undergone prosthetic cardiac valve replacement a minimum of 18 months before, haptoglobin was absent in 32, decreased in 2, normal in 1, and unknown in 4; LDH was elevated in 36, normal in 2, and unknown in 1; and anemia was present in only 8. Gallstones were found in 12 (31%). Another group of 23 patients (10 men and 13 women, aged 25-70 yr) with valvular heart disease were studied prior to cardiac valve replacement. Haptoglobin was absent in 3, decreased in 4, normal in 9, and unknown in 7; LDH levels were elevated in 6, normal in 10, and unknown in 7; anemia was present in 5, absent in 16, unknown in 2. Gallstones occurred in 3 (13%).

0633 CHEMICAL COMPOSITION OF NEW ZEALAND GALLSTONES. *(E.)* Carlisle, V. F.; Tasman-Jones, C. (Dept. Med., Univ. Auckland, New Zealand). *Am. J. Surg.* 126(3):403-410, 1973.

Quantitative microanalysis of gallstones taken from 40 New Zealand patients shows that cholesterol gallstones predominate (88%). Analysis of multiple stones from the same patient showed the composition of these stones was similar. Analysis of individual stones in layers failed to reveal significant differences in composition. In stones of mixed composition, very high unidentified residues were found. Some stones found in this series support the theory that cholesterol stones are formed around a nucleus. Others supported the theory that cholesterol stones are first a colloidal mass with crystallization proceeding from the outside towards the center. No evidence was observed to suggest that cholesterol stones are produced by other than lithogenic bile from the liver. A more rigorous definition of cholesterol and mixed gallstones is deemed necessary so that the different environments under which each is formed may be noted and the type of stone present can be diagnosed by clinically accessible secretions.

0634 A CONSTANT BILE DUCT ANOMALY ENCOUNTERED DURING BILXIARY OPERATION. *(E.)* Murray, H. O. L. (no affil.). *Am. Surg.* 39(8):438-444, 1973.

In 309 consecutive cholecystectomies performed with operative cholangiography, 4 patients (2 males and 2 females, aged 20-62 yr) showed clinical evidence of an accessory bile duct. In 3 of the 4, the accessory bile duct joined the cystic duct. In the 4th case, the accessory duct joined the common hepatic duct immediately above the site of the former cystic duct. One patient also had situs inversus. It is suggested that a technique of cholecystectomy which permits visualization of the bile duct and environs during removal of the gallbladder permits recognition of the anomaly and should be used. Once an identity is made, the cystic artery is tied, the gallbladder is then dissected from the fundus down, exposing the gallbladder bed in which accessory ducts may be seen. In this series the incidence of accessory duct anomalies was less than 1.3% in operative cases. When bile leakage is suspected, a T-tube should be employed to drain the common bile duct. In the series 1 patient was found with no gallbladder, but choledocholithiasis was present; this is a very rare anomaly.

0635 ULTRASTRUCTURE OF THE HUMAN GALL-BLADDER EPITHELIUM IN CHOLELITHIASIS AND CHRONIC CHOLECYSTITIS. *(E.)* Fox, H. (Dept. Pathol., Univ. Manchester, England). *J. Pathol.* 108(2):157-164, 1973.

The gallbladder mucosa from 8 patients undergoing cholecystectomy for gallstones was examined under the electron microscope. All 8 samples showed some degree of nonspecific chronic inflammatory-cell infiltration. The mucosa ranged from morphologically normal in 3 cases to atrophic in 2. A mild degree of fibrosis of the lamina and the subserosa was noted in 5 cases. None contained cholesterol deposits or any evidence of neoplasms. In all cases the epithelial cells showed marked mucus secretory activity. Less common changes were a flattening of the columnar epithelial cells, with a loss of microvilli from their free surface, an excess of dark "pencil" cells, focal intestinal metaplasia and hypertrophy of the Golgi apparatus. Protrusion of cytoplasmic particles into the gallbladder lumen occurred in 2 cases, but degenerative changes were uncommon in the epithelial cells. It is suggested that in chronic gallbladder disease the mucosal epithelium tends to assume a secretory, rather than a predominantly absorptive, function.

0636 INCIDENCE OF GALLBLADDER DISEASE IN CANADA, ENGLAND, AND FRANCE. *(E.)* Plant, J. C. D.; Percy, I.; Bates, T.; Gastard, J.; Hita de Nercy, Y. (Wayne State Univ., Sch. Med., Detroit, Mich.). *Lancet* (7832):249-251, 1973.

A comparison was made of the number of gallbladder operations performed in 1961 and 1971 in 3 similar towns in Canada, England, and France. Although the incidence of cholecystectomy seems to be 6 times higher in Canada than in England or France, the rate of increase appears to be the same in all 3 countries. In Canada the incidence of cholecystectomy reached a maximum at 20-29 yr with a second maximum in the 40-49 yr group. In England maxima occurred at 40-49 yr and at 60-69 yr, while in France there was only 1 maximum in the 50-59 yr age group. In all 3 towns, but particularly in North America, a significant number of patients under 35 yr old were at or below normal weight. These findings suggest that dietary factors other than simple obesity are involved in the formation of gallstones. A comparison of dietary studies on these countries showed that prepared or processed food is consumed more in North American, to a lesser extent in England, and hardly at all in rural France. Since many food additives are powerful liver enzyme inducers, excessive consumption of these agents may be involved in gallstone formation.

0637 THE INCIDENCE AND SURGICAL SIGNIFICANCE OF CHOLELITHIASIS IN SICKLE CELL ANEMIA AND SICKLE CELL TRAIT. *(E.)* Golding, T. N.; Adeyemo, A.; Kurtz, L. (Freedmen's Hosp., Washington, D. C.). *J. Natl. Med. Assoc.* 65(5):410-414, 1973.

A retrospective study of cholelithiasis was made in 50 patients with proven sickle cell hemoglobinopathy (35 homozygous patients with sickle cell anemia and 15 heterozygotes for the sickle cell trait). Evidence of cholelithiasis was found in 13 of the 35 patients (37.14%) with sickle cell anemia and in 3 of the 15 (20%) who were heterozygotes for the sickle cell trait. These figures were much higher than the 10% generally accepted as the incidence of cholelithiasis in the normal population. The incidence of cholelithiasis was high (61.54%) among the 13 patients with anemia who were under 30 yr old and among males (8 of the 14 homozygous males had cholelithiasis). It is suggested that glucose-6-phosphate dehydrogenase deficiency, which is present in a large number of the patients with sickle cell trait, may contribute to hemolysis, with subsequent hyperbilirubinemia and cholelithiasis. Cholecystography should be performed on all patients with sickle cell trait who have recurrent abdominal pain since it is difficult to distinguish between acute cholecystitis and the painful crises of sickle cell anemia on the basis of clinical and laboratory evidence. The treatment of choice is elective cholecystectomy unless the patient is in an aplastic crisis.

0638 LIMY BILE. *(E.)* Hyland, G.; O'Connell, T. C. J. (St. Vincent's Hosp., Dublin, Ireland). *J. Irish Med. Assoc.* 66(13):354-357, 1973.

Episodes of severe epigastric pain with vomiting persisted for 4 months in a 54-yr-old woman. Diarrhea and vomiting with intermittent jaundice persisted for 3 months in a 67-yr-old man. In the first case, radiological examination revealed calculi in the gallbladder plus a fluid level which did not contract after administration of a fatty meal, a characteristic of limy bile. The wall of the gallbladder was severely hypertrophied, contained mixed stones surrounded by a white oily viscous tooth-paste like material. The paste consisted largely of calcium carbonate with traces of calcium and magnesium phosphate, while stones consisted of cholesterol with small amounts of bile salts, calcium carbonate, and phosphate. Chronic cholecystitis with Rokitansky-Aschoff sinuses was revealed. In the male patient, the gallbladder was delineated on plain x-ray as though the patient had a cholecystogram. Laparotomy revealed unresectable carcinoma of the head of the pancreas with limy bile in the common bile duct and gallbladder. No calculi were found. Analysis showed the bile consisted almost entirely of calcium carbonate with minimal quantities of bile salts. The lack of bile in the gallbladder of the first patient suggests that the duct was so obstructed so that bile could neither enter nor leave the gallbladder. Changes in pH, local calcium metabolism, and mucosal morphology are essential for the production of limy bile. Serum calcium levels are not of diagnostic or prognostic value.

0639 ESTIMATION OF CHOLESTEROL AND BILE ACID TURNOVER IN MAN BY KINETIC ANALYSIS. *(E.)* Quarfordt, S. H.; Greenfield, M. F. (Duke Univ. Med. Ctr., Durham, N. C.). *J. Clin. Invest.* 52(8): 1937-1945, 1973.

The kinetics of cholesterol and bile acid turnover were determined from an analysis of the biliary lipids after a single i.v. injection of labeled cholesterol. A compartmental model was designed for the system, and the fractional metabolic rates and fluxes were determined in 1 lean and 2 obese normal humans. Each of the normals converted about 3%/day of their rapidly miscible cholesterol pool to cholic acid and 1%/day or less to chenodeoxycholate. Cholate was catabolized at twice the rate of dihydroxy bile acids in these normal subjects. Of the normal subjects, 2 were fed corn oil with little change in their kinetic parameters from the control state. The other normal subject received cholestyramine

(16 g/day) which dramatically increased the bile acid flux with little change in neutral sterol catabolism. No deoxycholate was identified in the bile of a cirrhotic patient. The amount of cholesterol lost as neutral sterol and the amount of conversion to cholic acid were significantly less than in normal subjects. The daily neutral sterol and bile acid fluxes were fairly normal, due to the much larger size of the rapidly miscible cholesterol pool. The size of the cholic acid pool was significantly less than normal, while the fractional catabolic rate of chenodeoxycholate appeared to be more rapid than normal.

0640 ASCENDING CHOLANGITIS AFTER SUCCESSFUL SURGICAL REPAIR OF BILIARY ATRESIA. *(E.)*

Kobayashi, A.; Utsunomiya, T.; Ohbe, Y.; Shimizu, K. (Natl. Children's Hosp., Tokyo, Japan). *Arch. Dis. Child.* 48(9):697-703, 1973.

During a 5-yr period, 55 patients (35 females and 20 males) were diagnosed as having biliary atresia. Only 3 of the 55 cases were of the so-called surgically correctable type. In the other 52 cases, the proximal hepatic ducts were absent or rudimentary. The operation performed in all incorrectable cases was hepatic portojejunostomy. Of the correctable cases, 2 were treated with hepaticojejunostomy and the other with choledochojejunostomy in Roux-en-Y fashion. Good bile excretion after surgery was noted in 13 patients, 3 correctable and 10 incorrectable cases. In addition, hepatic portojejunostomy was successful in repairing 4 cases admitted with biliary atresia. The age of these 17 patients ranged from 4 weeks to 3 1/2 months. Of the 17, 8 (5 females and 3 males, aged 29-102 days at operation) developed ascending cholangitis 3 1/2 to 8 1/2 months after surgery. Total serum bilirubin ranged from 2.5-9.9 mg/100 ml; alkaline phosphatase, 36.8-83.4 Kind-King U; SGOT, 18-122 U; and SGPT. 2-96 U. Of these 8 cases, 4 received a two-stage procedure of hepatic portojejunostomy, 2 received a 1-stage operation, 1 had a choledochojejunostomy, and 1 a hepaticojejunostomy. Ascending cholangitis in these patients was characterized by repeated attacks of fever, reappearance of obstructive jaundice, raised erythrocyte sedimentation rate, leucocytosis with shift to the left, and anemia. The condition was often resistant to antibiotic therapy and was fatal in 3 cases in this series. No surgically uncorrected patient developed cholangitis, suggesting that patency of the intra- and extrahepatic biliary passages is essential for the development of the disease.

0641 THE EFFECT OF PSYLLIUM HYDROCOLLOID AND CHOLESTYRAMINE ON HEPATIC BILE LIPID COMPOSITION IN MAN. *(E.)*

Beher, W. T.; Schuman, B. M.; Block, M. A.; Lin, G. J.; Casazza, K. K. (Edsel B. Ford Inst. Med. Res., Detroit, Mich.). *Henry Ford Hosp. Med. J.* 21(1):21-30, 1973.

The effects of a mucoid, psyllium hydrocolloid, and an anion exchange polymer, cholestryamine, on the total cholesterol, total phospholipid, total bile salt, cholate, chenodeoxycholate, and deoxycholate concentrations of hepatic bile were determined in 6 post-cholecystectomy patients (5 females and 1 male). Bile was obtained by drainage through an indwelling T-tube, which was clamped except during collection. Psyllium hydrocolloid treatment (12 g/day, for 6-29 days) had little or no effect on the cholesterol or phospholipid concentration of hepatic bile. However, such treatment did increase the total bile salt pool by gradually increasing the concentration of deoxycholate. Cholestyramine treatment (12 g/day, for 8-12 days) had no significant effect on cholesterol, phospholipid or total bile salt concentrations. There was a significant increase in the tri- to dihydroxy bile salt ratio due to decreases in chenodeoxycholate and deoxycholate concentrations. Because of reductions in concentrations of taurine conjugates and compensating increases in glycine conjugates, the ratio of taurine to glycine conjugates decreased. It was concluded that changes effected by psyllium hydrocolloid may result in more stable bile micelles and greater cholesterol solubility. No definite conclusions were reached with regard to cholestyramine's effects.

0642 INFLUENCE OF AGE AND SEX ON GALLBLADDER EMPTYING INDUCED BY A FATTY MEAL IN NORMAL SUBJECTS. *(E.)*

Sacchetti, G.; Mandelli, V.; Roncoroni, L.; Montanari, C. (Med. Dept., Carlo Erba, Milan, Italy). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 119(1):40-45, 1973.

Normal gallbladder emptying induced by a fatty meal (2 egg yolks) was studied by oral cholecystography in 402 normal subjects (172 men and 230 women, aged 15-63 yr) without gastrointestinal disorders. Roentgenograms were made at intervals up to the 60th min after the meal. The radiopaque areas were measured planimetrically to provide a quantitative assessment of emptying. The emptying pattern was compatible with an exponential function. Emptying was faster in men. Emptying was significantly faster in men over 50 yr of age than in young people aged 15-20 yr. The emptying rate increased with age in men but not in women.

0643 ENDOSCOPIC AND RADIOLOGICAL REPRESENTATION OF ENTEROBILIARY FISTULAS. *(Ger.)*

Fruhmorgen, P.; Classen, M. (Med. Clin., Univ. Erlangen-Nurnberg, Erlangen, Germany). *Z. Gastroenterol.* 10(6):415-420, 1972.

Fiberendoscopy was used with radiological monitoring to visualize enterobiliary anastomoses in 15 patients. The anastomoses included 10 choledochoduodenostomies and 3 cholecystoduodenostomies which were all performed to alleviate obstructive jaundice. In addition, 1 patient had a cystoduodenostomy and 1 had a spontaneous cholecystoduodenostomy. In all cases laboratory findings were atypical or equivocal, and serum and urinary diastase activities were not significantly increased. Symptoms consisted of pain in the upper abdomen (10 cases), episodes of fever (4), jaundice (3), and partial ileus (1);

2 patients were asymptomatic at follow-up. In addition to fiberendoscopy and selective cholangiography, a radiological examination of the stomach and intestine was performed with barium contrast in 12 cases. It was demonstrated that symptoms were caused by chronic recurrent pancreatitis (6 cases), pancreatic lithiasis (2), pancreatic carcinoma (4), cholelithiasis (1), chronic aggressive hepatitis (1), and recurrent cholangitis (1). None of the anastomoses was stenotic and none required surgical revision.

0644 FREE GALLBLADDER PERFORATION AND BILE PERITONITIS WITHOUT PERFORATION. *(Ger.)*

Bussmann, J. F.; Loewe, K. R.; Kohler-Heurich, H. (Mannheim Clin., Univ. Heidelberg, Germany). *Langenbecks Arch. Chir.* 333(2):133-144, 1973.

Of 7338 patients who underwent cholecystectomies in a 22-yr period, 67 (40 women and 27 men, aged 36-86 yr; mean age 65 yr) developed bile peritonitis. Peritonitis was caused by spontaneous perforation of the gallbladder in 51 cases, iatrogenic perforation in 2, and traumatic perforation in 2; in 12 cases bile seeped through the gallbladder without any evidence of perforation. Perforation occurred in the gallbladder fundus in 30 cases, corpus in 7, and neck in 7; no information about the site of perforation was available in 11 cases. Of the 67 patients with gallbladder perforations, 38 had cholelithiasis, 9 choledocholithiasis with no stones in the gallbladder, and 8 had no stones; no information was available in 8 cases. Cholelithiasis was diagnosed in 3 patients who had bile peritonitis without gallbladder perforation: 2 had choledocholithiasis with no stones in the gallbladder, 6 had no stones, and no information was available in 1 case. With the exception of patients who had iatrogenic and traumatic perforations, all patients had ulcerative phlegmonous cholecystitis, generally involving the entire gallbladder. Vasculitis was observed in the gallbladders of 3 patients who had bile peritonitis but no gallbladder perforation. Bacterial cultures, made in 10 cases, showed that 4 had *Escherichia coli*, 1 *E. coli* + *Proteus vulgaris*, 1 *Salmonella paratyphi* B (a chronic carrier) and 1 *Micrococcus pyogenes aureus*; cultures were sterile in the remaining 3 cases. Surgery was performed on 66 of these 67 patients and consisted of cholecystectomy in 56 cases, revision of the bile duc ducts in 17, choledochoduodenostomy in 7, and suturing of the gallbladder in 1 patient with an iatrogenic perforation. Only abdominal drainage was performed on 9 patients who were in poor condition. Death from bile peritonitis occurred in 36 of the 67 patients (54%). The prognosis depended more upon the time elapsed from perforation to surgery than on the age of the patient. It is concluded that gallbladder perforation may be caused by ulcerative cholecystitis with or without cholelithiasis, by activation of trypsinogen in the bile ducts, or by an allergic reaction like the Shwartzman-Sanarelli phenomenon or localized vasculitis.

0645 GALLSTONES IN CHILDREN. *(E.)*

Newman, D. E. (Vancouver Gen. Hosp. Canada). *Pediat. Radiol.* 1(2):100-104, 1973.

The incidence, treatment, pathology, and etiology of cholelithiasis were studied in 133,400 children (aged 16 yr and under) from 1951-1970. In this 20-yr period, there were 19 cases of childhood cholelithiasis, 79% of which occurred in girls and 21% in boys. There is a general trend toward an increasing number of cases per year, particularly between the years 1965 and 1970. Cholelithiasis is most common in the preadolescent and adolescent age groups. The clinical findings of the 19 patients included: right upper quadrant or epigastric pain, nausea and vomiting, intolerance to fatty foods, previous appendectomy, epigastric or right upper quadrant tenderness, normal abdomen, acute abdomen, and jaundice. Radiology was the most useful diagnostic tool, resulting in a diagnosis of gallstones or changes highly suggestive of gallstones in all cases. Eighteen of the 19 patients were managed surgically with a cholecystectomy. Pathologic examination of the gallbladder revealed 2 patients with acute cholecystitis, 1 of whom had an empyema; 15 patients with chronic cholecystitis all of which were mild; and 2 patients who had normal gallbladders. The possible etiologic factors in childhood cholelithiasis include: hemolytic anemia, overweight, family history of cholethiasis, previous abdominal surgery or infection, and pregnancy.

0646 BILIARY-DUODENAL DYNAMICS IN MAN. CINERADIOGRAPHIC AND MANOMETRIC STUDIES FOLLOWING ADMINISTRATION OF DRUGS AND HORMONES. *(E.)*

Salik, J. O.; Siegel, C. I.; Mendeloff, A. I. (Sinai Hosp., Baltimore, Md.). *Radiology* 106:1-11, 1973.

Cineradiographic, 70-mm film and intraluminal manometric studies of the common bile duct and duodenum were undertaken on 53 patients with T-tubes 5-8 days after cholecystectomy, and 31 with intact gallbladders. These studies were made during a baseline period and again following administration of cholecystokinin (75 to 150 Ivy U, s.c.); the anticholinergic agents methscopolamine (1.0 mg, s.c.) and bellafoline (0.6 or 1.0 mg, s.c.); the smooth muscle relaxants nitroglycerin (0.6 mg, sublingual) and dicyclomine (20 mg, s.c.); and the analgesics morphine sulphate (1 mg/10 kg), meperidine (50 to 150 mg, parenterally) and morphine given in combination with cholecystokinin or atropine (1 mg, s.c.). Common duct flow generally correlated inversely with duodenal motor activity. Where discrepancies did occur, they could be explained by the fact that manometry measures intraluminal pressure alone, whereas cineradiography gives a composite picture of the tone, motility, and caliber of the structures examined. Autonomous sphincter of Oddi dampening or blocking of duodenal motor activity could account for a pattern in which duodenal activity was increased with a change in parallelism between the activity of the duodenum and the distal common duct. Questions remain on response of the atropinized hypotonic duodenum to morphine, which apparently affects different receptors or muscles. The method used in this study could evaluate various drugs acting on the choledochoduodenal segment.

0647 RADIOIMMUNOASSAY OF CONJUGATED CHOLYL BILE ACIDS IN SERUM. *(E.)* Simmonds, W. J.; Korman, M. G.; Go, V. L. W.; Hofmann, A. F. (Mayo Clin., Rochester, Minn.). *Gastroenterology* 65(5):705-711, 1973.

A rapid, sensitive, specific, and valid radioimmunoassay was developed for conjugated cholyl bile acids in unextracted serum. It uses antiserum, produced in rabbits, to cholylglycine coupled by amide linkage to bovine serum albumin. In a radioimmunoassay system, [^{3}H]cholylglycine and antibody reached equilibrium in 1 hr at 42 C. Bound antigen was precipitated by polyethylene glycol, and the free antigen in the supernate was determined by liquid scintillation spectrometry. The displacement curve was linear when the percentage binding of tracer was plotted against logarithmic increase of unlabeled cholylglycine from 5 to 80 picomoles. The antibody found cholylglycine and cholyltaurine similarly, but showed much less affinity for conjugated dihydroxy bile acids or unconjugated bile acids. Cholesterol and hormonal steroids were not bound. The final assay method used less than 0.1 ml of serum and was validated by showing close agreement between radioimmunoassay values and those determined by gas liquid chromatography. In 40 fasting normal subjects, serum levels of immunoreactive conjugated cholyl bile acids were less than 1 μM. This method should be useful for assessing hepatic function in health and disease. In assaying serum samples from a group of 32 patients with chronic hepatitis, a subgroup arose with serum bile acid values definitely above the normal range, but with normal bilirubin values. This suggests that serum bile acid determinations may be useful for detecting impaired liver function when the serum bilirubin level is normal.

0648 ORAL FIBROSCOPIC REMOVAL OF STONES FROM THE COMMON BILE DUCT. *(Ger.)* Deyhle, P.; Fumagalli, I.; Nuesch, H. J.; Holdener, F.; Siegenthaler, G. (Univ. Zurich Med. Sch., Switzerland). *Dtsch. Med. Wochenschr.* 98(41):1891-1892, 1973.

0649 RELATIONSHIP OF GALLBLADDER DISEASE TO PARITY, OBESITY, AND AGE. *(E.)* Bernstein, R. A.; Werner, L. H.; Rimm, A. A. (Med. Coll. Wisconsin, Milwaukee). *Health Serv. Rep.* 88(10):925-936, 1973.

0650 CANCER OF THE GALLBLADDER: REPORT ON FORTY-NINE CHOLECYSTECTOMIZED CASES. *(Fr.)* Arianoff, A. A.; Vielle, G.; Dewulf, E. (St. Elizabeth Clin., Brussels, Belgium). *Acta Gastroenterol. Belg.* 36(6):310-331, 1973.

0651 EXPLORATION OF THE COMMON BILE DUCT IN THE PRESENCE OF ACUTE CHOLECYSTITIS. *(E.)* Pheils, M. T.; Duraiappah, B. (Repatriation Gen. Hosp., Concord, Australia). *Aust. N.Z. Surg.* 43(2): 136-139, 1973.

0652 CLASSIFICATION AND DIAGNOSTIC SIGNIFICANCE OF CLINICAL SYMPTOMS OF CHRONIC CHOLECYSTITIS. *(Rus.)* Tsimmerman, Ia. S.; Golovskoi, B. V. (Perm Med. Inst., USSR). *Vrach. Delo* (10):13-17, 1973.

0653 CHOLESTEROL GALLSTONE FORMATION: RECENT ADVANCES IN PATHOPHYSIOLOGY. *(E.)* Lukie, B. E.; Dietschy, J. M. (Univ. Texas Southwestern Med. Sch., Dallas). *Tex. Med.* 69(11):90-100, 1973.

0654 INCOMPETENCE OF THE SPHINCTER OF ODDI ASSOCIATED WITH DUODENAL STENOSIS. *(E.)* Kirks, D. R.; Baden, M. (Brooke Army Med. Ctr., Fort Sam Houston, Texas). *J. Pediatr.* 83(5):838-840, 1973.

0655 CHOLESTEROL-BILE ACID INTERACTIONS IN GALLSTONE PATHOGENESIS. *(E.)* Grundy, S. M. (Univ. California Med. Sch., San Diego). *Hosp. Pract.* 8(12):57-65, 1973.

0656 A CASE OF LIMY BILE UNDERGOING UNUSUALLY RAPID CHANGES IN ITS RADIOLOGICAL FINDINGS. *(Cz.)* Kraus, J. (Cheb District Health System, Marianske Lazne, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 27(1):32-35, 1973.

0657 PATHOGENESIS OF CHOLELITHIASIS: SECRETION OF BILIARY LIPIDS AND CHOLESTEROL CHOLELITHIASIS. (PART I). *(Fr.)* Gerolami, A.; Montet, J. C. (Unit Gasterol. Dis., INSERM, Marseille, France). *Biol. Gastroenterol. (Paris)* 6(1):63-71, 1973.

0658 STRATIFICATION OF BILE IN INTRAVENOUS CHOLANGIOGRAPHY. *(E.)* Kawarada, Y.; Haskin, M.; Matsumoto, T. (Hahnemann Med. Coll. Hosp. Philadelphia, Pa.). *Int. Surg.* 58(11):795-796, 1973.

0659 SOME CLINICAL CHARACTERISTICS OF ACUTE EXACERBATIONS OF CHRONIC CHOLECYSTITIS. *(Cz.)* Keclik, M.; Huslarova, A.; Skachova, J.; Uhlir, Z. (Fac. Gen. Med., Charles Univ., Prague, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 27(4): 209-216, 1973.

0660 OBSTRUCTIVE JAUNDICE, THE RADIOLOGIST, THE SURGEON, AND THE PATIENT. *(E.)* Young, W. B. (Roy. Free Hosp., London, England). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 119(1):4-39, 1973.

0661 LITHIASIS OF THE COMMON BILE DUCT. *(Fr.)* Gattegno, B.; Teyssier, P.; Huguier, M. (Fac. Med., Paris, France). *Concours Med.* 95(16): 2877-2883, 1973.

0662 ESTABLISHMENT OF INTERNAL MEDICAL INDICATIONS FOR SURGERY ON THE GALLBLADDER AND BILIARY TRACT. *(Ger.)* Sailer, S.; Heschl, R.; Tilz, G. P. (Internal Med. Clin., Univ. Graz, Austria). *Wien. Med. Wochenschr.* 123(34/36):521-523, 1973.

See also, 0153, 0271, 0274, 0275, 0287, 0288, 0295, 0307, 0318, 0319, 0323, 0551, 0564, 0720, 0732, 0741, 0790.

GENERAL

0663 AD LIBITUM ORAL GLUCOSE-ELECTROLYTE THERAPY FOR ACUTE DIARRHEA IN APACHE CHILDREN. *(E.)* Hirschhorn, N.; McCarthy, B. J.; Ranney, B.; Hirschhorn, M. A.; Woodward, S. T.; Lacapa, A.; Cash, R. A.; Woodward, W. E. (Johns Hopkins Univ. Sch. Med., Baltimore, Md.). *J. Pediatr.* 83(4):562-571, 1973.

Diarrhea caused hospitalization of 47 children (28 girls and 19 boys; 45 under the age of 2 yr). A recognized pathogen was found in the stool of 21% of the cases. Children who were strong enough to drink and had bowel sounds were generally able to take sufficient amounts of a hypotonic glucose-electrolyte solution appropriate to their requirements for volume replacement and maintenance. Clinically apparent volume depletion (present in 48% of the patients), moderate hypo- and hypernatremia, and acidosis were readily corrected. Children originally in shock (3) could drink the solution after rapid i.v. volume replacement. In 2 children with severe glucose intolerance, several days' use of a carbohydrate-free formula and broad-spectrum antibiotics brought about recovery. *Ad libitum* oral therapy is effective, comfortable, and inexpensive, and may reduce the morbidity and mortality rates of infantile diarrhea.

0664 THE EFFECT OF ESCHERICHIA COLI ENTEROTOXINS ON THE SMALL INTESTINE WITH OR WITHOUT DIRECT MUCOSAL CONTACT. *(E.)* Staley, T. E.; Jones E. W.; Smith-Staley, J. A. (Coll. Vet. Med., Oklahoma State Univ., Stillwater). *Am. J. Dig. Dis.* 18(9):751-756, 1973.

There was a progressive increase in intraintestinal fluid volume in rabbits after direct mucosal contact with 2 *Escherichia coli* enterotoxins. Also the mucosa continued to secrete for a 2-hr period despite flushing of the enterotoxin from the isolated loops. These enterotoxins are apparently bound tightly to the intestinal epithelial cell and the effect is sustained. In the intestinal loops not having direct mucosal contact with enterotoxin, the intraintestinal fluid volume remained relatively constant. These results indicated that enterotoxin in an isolated loop influenced the fluid movement in adjacent loops throughout the entire test period. Failure of the intestinal fluxes to return to normal after flushing of the intestinal loop may have been due to a failure to adequately bind enterotoxin or to an intestinal immunity.

0665 SERUM VITAMIN A, RETINOL-BINDING PROTEIN, AND PREALBUMIN CONCENTRATIONS IN PROTEIN-CALORIE MALNUTRITION. II. TREATMENT INCLUDING SUPPLEMENTAL VITAMIN A. *(E.)* Smith, F. R.; Goodman, D. W.; Arroyave, G.; Viteri, F. (Dept. Med. Columbia Univ., New York, N. Y.). *Am. J. Clin. Nutr.* 26(9):982-987, 1973.

The serum retinol transport system was studied in 8 Central American boys (18-65 months old) with marasmic kwashiorkor before and after treatment with protein, calories, and supplemental vitamin A. Serum concentrations of vitamin A, retinol-binding protein, and prealbumin increased significantly with therapy, as did concentrations of serum albumin and total protein and the creatinine-height index. During treatment highly significant correlation was observed between the levels of vitamin A, retinol-binding protein, and prealbumin, suggesting that diet therapy had a similar effect on retinol-binding holoprotein and prealbumin. No correlations were found between serum concentrations of vitamin A, retinol-binding protein, or prealbumin and the serum albumin concentration or creatinine-height index. Vitamin A, retinol-binding protein, and prealbumin concentrations generally reached a maximum after 20-40 days of treatment but decreased after 60-90 days, whereas serum albumin and total protein concentrations and the creatinine-height index increased progressively during therapy in almost all patients. It is concluded that factors other than the availability of amino acid and protein substrate influence serum retinol transport in protein-calorie malnutrition.

0666 SERUM VITAMIN A, RETINOL-BINDING PROTEIN, AND PREALBUMIN CONCENTRATIONS IN PROTEIN-CALORIE MALNUTRITION. I. A FUNCTIONAL DEFECT IN HEPATIC RETINOL RELEASE. *(E.)* Smith, F. R.; Goodman, D. S.; Zaklama, M. S.; Gabr, M. K.; El Maraghy, S.; Patwardhan, V. N. (Dept. Med., Columbia Univ., New York, N. Y.). *Am. J. Clin. Nutr.* 26(9):973-981, 1973.

Components of the plasma vitamin A transport system have been examined in 33 Egyptian children with varying degrees of protein-calorie malnutrition and in 15 sex- and age-matched controls. Classical kwashiorkor in 21 children (16 boys and 5 girls, mean age 1.8 yr) was associated with significantly decreased concentrations of serum retinol-binding protein, prealbumin, vitamin A, carotenoids, albumin, and total protein. After diet therapy, but without supplemental vitamin A, 11 patients with kwashiorkor had highly significant increases in concentrations of vitamin A, retinol-binding protein, and prealbumin by the end of the 2nd week with further increases occurring by the 4th week and were considered to be clinically cured. Vitamin A, retinol-binding protein, and prealbumin concentrations were comparable to or higher than those of the controls at discharge. In 6 children with marasmus (5 boys and 1 girl, mean age 1.5 yr) pretreatment vitamin A and retinol-binding protein concentrations did not differ significantly from controls. Highly significant correlations were observed between serum vitamin A, retinol-binding protein, and prealbumin concentrations during treatment of kwashiorkor. These findings suggest that the low serum vitamin A levels in kwashiorkor largely reflect a functional impairment in hepatic release of vitamin A, rather than vitamin A deficiency. This impairment results from defective hepatic production of plasma proteins, including plasma transport proteins for retinol, because of a limiting supply of substrate for protein synthesis. When dietary calories and protein supply the necessary substrate, hepatic production of plasma proteins increases, plasma retinol-binding protein and prealbumin concentrations rise, and consequently plasma vitamin A concentration increases.

0667 SERUM IMMUNOGLOBULIN E (IgE) CONCENTRATIONS IN PATIENTS WITH GASTROINTESTINAL DISORDERS. *(E.)* Brown, W. R.; Lansford, C. L.; Hornbrook, M. (Univ. Colorado Med. Ctr., Denver). *Am. J. Dig. Dis.* 18(8):641-645, 1973.

IgE concentrations, measured by radial immunodiffusion, were normal in 71 patients with giardiasis, amebiasis, chronic ulcerative colitis, regional enteritis, chronic liver diseases, or nontropical sprue. Concentrations were above the normal range in 2 of 7 patients infested with intestinal roundworms. IgE was undetectable in 2 patients with an associated deficiency of IgA and gluten-sensitive enteropathy and in 3 patients with generalized hypogammaglobulinemia, giardiasis, and malabsorption. This study of IgE in serum provides no evidence of activation of the IgE immunologic system in the disorders studied, other than in roundworm infestations. The findings suggest however, that IgE deficiency is common in immunodeficiency-related gut disorders, although the pathogenetic significance of the IgE deficit remains uncertain.

0668 SERUM IMMUNOGLOBULINS AND COPROANTIBODY FORMATION IN INFANTS AFTER ARTIFICIAL INTESTINAL COLONIZATION WITH ESCHERICHIA COLI 083 AND ORAL LYSOZYME ADMINISTRATION. *(E.)* Lodinova, R.; Jouja, V.; Wagner, V. (Inst. Care Mother and Child, Prague, Czechoslovakia). *Pediatr. Res.* (7):659-669, 1973.

The influence of oral colonization with nonenteropathogenic *Escherichia coli 083* and feeding with lysozyme in breast-fed and bottle-fed infants on the production of immunoglobulins and antibodies in serum and stool filtrates were studied. In colonized infants, *E. coli 083* was detected in the stool from the 2nd day after p.o. administration and predominated for up to 16 weeks. The serum antibody against *E. coli 083* increased the 4th week after colonization and remained higher than in controls until 16 weeks. At that age the antibody level did not differ from the bottle-fed control group. In breast-fed control subjects, however, the titer remained low. Immunoglobulin G (IgG) passively transferred from the mother decreased slowly and from the 12th week an increase, which was probably due to the infants' own production, was shown. In breast-fed control subjects, no decrease was noticed. Immunoglobulin A (IgA) level went up gradually from the 4th week in all groups of infants. The colonization and lysozyme administration did not significantly influence the serum immunoglobulin levels. Coproantibody formation was detected in colonized, artificially fed infants at 4 weeks and the maximum level persisted to 16 weeks. In breast-fed, colonized infants the coproantibody level was significantly higher between 2 and 6 weeks when compared with controls. Immunoglobulin M was detectable only in the bottle-fed colonized group, from the 4th to 16th week. Secretory IgA level in breast-fed, colonized, and control infants was high between 1 and 8 weeks. In bottle-fed, colonized infants IgA increased from the 4th week and remained significantly higher in the 6th, 12th, and 16th week when compared with control subjects. No IgG was found in stool filtrates of any group. No difference in the coproantibody response was observed between the lysozyme-fed and the artificially fed control groups. The artificial colonization induced a formation of secretory IgA. This effect was masked in the breast-fed infants because of passive transfer of this immunoglobulin. The lack of IgA in bottle-fed infants was substituted by active formation caused by artificial colonization.

0669 EFFECTS OF CYCLOHEXIMIDE ON THE RESPONSE OF INTESTINAL MUCOSA TO CHOLERA ENTEROTOXIN. *(E.)* Kimberg, D. V.; Field, M.; Gershon, E.; Schooley, R. T.; Henderson, A. (Harvard Med. Sch., Boston, Mass.). *J. Clin. Invest.* 52:1376-1383, 1973.

The interaction between cycloheximide and cholera toxin has been examined in rabbits. Pretreatment of rabbits with cycloheximide (20mg/kg, i.v.) reduced by 60% the secretory response to cholera enterotoxin in isolated ileal loops with intact blood supply. That this antisecretory effect of cycloheximide persists *in vitro* was evidenced by sodium and chloride flux measurements on mucosa isolated from these and control loops. Measurements of radioactive leucine incorporation into mucosal protein indicated that the dose of cycloheximide employed inhibited protein synthesis by 90%. This effect was independent of any effect of cycloheximide on amino acid uptake across the brush border. Adenyl cyclase activity and cyclic AMP levels in ileal mucosa of cycloheximide-pretreated and control animals indicated that cycloheximide did not diminish the cholera enterotoxin-induced increases in these parameters. Thus, cycloheximide reduces cholera enterotoxin-induced intestinal fluid production without interfering with the cholera enterotoxin-induced increase in adenyl cyclase acitvity or the consequent rise in cyclic AMP concentration. As this antisecretory effect persists *in vitro* a direct interaction of the antibiotic with mucosal cell ion transport mechanisms is probably involved, rather than an indirect effect mediated by other humoral or neurogenic factors. It is also suggested that the secretory response of the intestine to cholera enterotoxin does not involve either the synthesis of new adenyl cyclase or a protein modifying its activity.

0670 EXPERIMENTAL GASTROSCHISIS IN THE FETAL RABBIT. *(E.)* Sherman, N. J.; Asch, M. J.; Isaacs, Jr., H.; Rosenkrantz, J. G. (Children's Hosp. Los Angeles, Calif.). *J. Pediatr. Surg.* 8(2):165-169, 1973.

0671 GASTROINTESTINAL MANIFESTATIONS OF BOTULISM: CASE OF ESOPHAGEAL PARALYSIS AND GASTRIC PARESIS WITH RADIOCINEMATOGRAPHIC, ENDOSCOPIC, AND MAMOMETRIC STUDIES. Klepping, C.; Destaing, F.; Martin, F.; Didier, J. P.; Villand, J.; Carli, H. (no affil.). *Rev. Fr. Gastroenterol.* (87):53-63, 1973.

0672 ACUTE PERICARDITIS: INITIAL MANIFESTATION OF AN AMEBIC ABSCESS OF THE LIVER. CURE BY MEDICAL TREATMENT ALONE. *(Fr.)* Klepping, C.; Villand, J.; Carli, H.; Gambert, B. (no affil.). *Rev. Fr. Gastroenterol.* (87):65-76, 1972.

0673 LATE ENTEROMESENTERIC METASTASIS FROM A TUMOR OF THE MEMBRANA GRANULOSA. *(Fr.)* Grisoli, J.; Farisse, J.; Argeme, M.; Delmont, J. P.; Lebreuil, G. (Conception Hosp., Marseille, France). *Sem. Hop. Paris* 49(9):649-655, 1973.

0674 LYMPHOCYTE TRANSFORMATION AND AMYLOIDOSIS. AN IMMUNOLOGIC STUDY OF 14 PATIENTS WITH BIOPSY-PROVED DISEASE. *(E.)* Briccetti, A. B.; Cathcart, E. S.; Cohen, A. S. (Univ. Hosp., Boston, Mass.). *Int. Arch. Allergy* 44(3):349-357, 1973.

0675 INFLUENCE OF A VIRAL ENTERIC INFECTION ON THE AMINOGRAM AND PATHOLOGY OF PROTEIN-CALORIE MALNUTRITION IN THE PIG. *(E.)* Isoun, T.; Whitehair, C. K.; Bergen, W. G. (Dept. Pathol., Michigan State Univ., East Lansing). *Am. J. Clin. Nutr.* 26(8):835-844, 1973.

0676 INTESTINAL STENOSIS AND ENTEROCYST FORMATION AS LATE COMPLICATIONS OF NEONATAL NECROTIZING ENTEROCOLITIS. *(E.)* Lloyd, D. A.; Cywes, S. (Dept. Pediatr. Surg., Univ. Cape Town, South Africa). *J. Pediatr. Surg.* 8(4):479-486, 1973.

0677 SALMONELLOSIS. *(E.)* Howell, R. T. (Div. Pub. Health Labs., Arkansas State Dept. Health, Little Rock). *J. Arkansas Med. Soc.* 70(1):57-69, 1973.

0678 TREATMENT OF ENTERIC TYPHOID WITH TRIMETHOPRIM-SULFAMETHOXAZOLE. *(Ger.)* Dammermann, R.; Freitag, V. (Gen. Hosp., Hamburg-Altona, Germany). *Dtsch. Med. Wochenschr.* 98(25):1251-1253, 1973.

0679 RADIOTHERAPY OF GASTROINTESTINAL TUMOURS. *(Ger.)* Karcher, K. H. (Clin. Radiotherapy, Univ. Vienna, Austria). *Wien. Klin. Wochenschr.* 84(44):705-708, 1972.

0680 THE GASTRIC SECRETION IN PELLAGRIC PATIENTS. *(Gr.)* Poulantzas, I.; Stratigos, I.; Dosios, T. (Clin. Dermatol. Syphilol., Univ. Athens, Greece). *Iatriki* 21(1):136-139, 1972.

0681 DIAGNOSTIC VALUE OF CHROMATIC DUODENAL TUBING IN DISEASES OF THE GALL BLADDER. *(Rus.)* Fischenko, A. Y. (Novosibirsk Med. Inst., USSR). *Klin. Med.* 50(7):58-64, 1972.

0682 TOXIC-SEPTIC SYNDROME IN INFANTS CAUSED BY E. COLI O 124:K 72 (B 17). *(Ger.)* Dragas, A. Z.; Zajc Satler, J.; Jancigaj, T. (Med. Fac., Ljubljana, Yugoslavia). *Z. Bakteriol.* [*Orig.*] 223(4):504-507, 1973.

0683 USE OF LACTOBACILLI IN THE TREATMENT OF NON-BACTERIAL GASTROENTERITIS. *(Fr.)* Chicoine, L.; Joncas, J. H. (St. Justine Hosp., Montreal, Canada). *Union Med. Can.* 102(5):1114-1115, 1973.

0684 THE EFFECT OF SECRETIN ON SERUM CALCIUM IN MAN. *(E.)* Isenberg, J. I.; Brickman, A. S.; Moore, E. W. (VA Hosp., Wadsworth, Calif.). *J. Clin. Endocrinol.* 37(1):30-33, 1973.

0685 INDIGENOUS PULSE PROTEIN FOOD USED IN KWASHIORKOR. *(E.)* Bhattacharyya, A. K.;

Chatterjee, S. (Sch. Trop. Med., Calcutta, India). *Arch. Child Health* 14(4):192-203, 1972.

0686 CLINICAL MANAGEMENT OF ADVANCED GASTROINTESTINAL CANCER. *(E.)* Moertel, C. G. (Mayo Clin., Rochester, Minn.). *Semin. Drug Treat.* 3(1):55-68, 1973.

0687 GASTROINTESTINAL BLEEDING IN HAEMOPHILIA. *(E.)* Forbes, C. D.; Barr, R. D.; Prentice, C. R. M.; Douglas, A. S. (Roy. Infirm., Glasgow, Scotland). *Q. J. Med.* 42(167):503-511, 1973.

0688 HEPATIC CHANGES IN ADULT α_1-ANTITRYPSIN DEFICIENCY. *(E.)* Palmer, P. E.; Wolfe, H. J.; Gherardi, G. J. (New England Med. Ctr. Hosp. Boston, Mass.). *Gastroenterology* 65(2):284-293, 1973.

0689 DISTURBANCES OF COAGULATION MECHANISM IN PROTEIN-CALORIE MALNUTRITION. *(E).* Hassanein, E. A.; Tankovsky, I. (Central Hosp., Tripoli, Libya). *Trop. Geogr. Med.* 25(2):158-162, 1973.

0690 CLASSIFICATION OF THE DISEASES OF THE GASTROINTESTINAL TRACT WITH CHANGES IN THE MUCUS SECRETION. *(Fr.)* Laumonier, R. (Henri Becquerel Ctr., Rouen, France). *Ann. Anat. Pathol. (Paris)* 17(3):349-353, 1972.

0691 SALMONELLOSES AND SHIGELLOSES IN BELGIUM DURING 1962-1971. *(Fr.)* Van Oye, E.; Robinet, R.; Van Goethem, H.; Maes, L. (no affil.). *Acta Gastroenterol. Belg.* 36(4-5):226-238, 1973.

0692 ABOUT HISTO-AUTORADIOGRAPHY IN THE PATHOLOGY OF THE GASTRO-INTESTINAL TRACT. *(Fr.)* Bescol-Liversac, J.; Leperchey, F. (no affil.). *Ann. Anat. Pathol.* 17(3):405-418, 1972.

0693 OCCURRENCE OF NON-CHOLERA VIBRIOS IN WEST GERMANY. *(Ger.)* Ko, H. L.; Lutticken, R.; Pulverer, G. (Inst. Hyg., Univ. Koln, Germany). *Dtsch. Med. Wochenschr.* 98(32):1494-1499, 1973.

0694 THE PATHOGENESIS OF CHOLERA AND SOME WIDER IMPLICATIONS. *(E.)* Sladen, G. E. (St. Bartholomew's Hosp., London, England). *Gut* 14(8):671-680, 1973.

0695 BACTERIAL ENDOTOXINS IN THE ENVIRONMENT. *(E.)* Di Luzio, N. R.; Friedmann, T. J. (Tulane Univ., Sch. Med., New Orleans, La.). *Nature* 244(5410):49-51, 1973.

0696 VISCERAL INVOLVEMENT IN SYSTEMIC SCLERODERMA. *(Rus.)* Shub, N. I. (Kiev Inst. Postgrad. Med., USSR). *Vrach. Delo* (5):39-42, 1973.

0697 ROLE OF SWEAT IN THE EPIDEMIOLOGY OF CHOLERA IN DRY COUNTRIES. *(Fr.)* Dodin, A.; Felix, H. (Pasteur Inst., Paris, France). *Bull. Acad. Natl. Med. (Paris)* 156(26/27):845-852, 1972.

0698 EVALUATION OF ABDOMINAL INJURIES. *(Ger.)* Fritze, E.; Rehn, J. (Med. Clin., Bergmannsheil Hosp., Bochum, Germany). *Chirurg* 43(7):314-317, 1972.

0699 ATHEROMATOUS LESIONS OF GASTROINTESTINAL ARTERIES: STUDY OF THEIR FREQUENCY AND THEIR EFFECT ON THE CALIBER OF THE VESSELS. *(Sp.)* Fernandez-Cruz, L.; Astudillo, E.; Pera, C. (Fac. Med., Univ. Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 38(8):903-920, 1972.

0700 EFFECTS OF ENZYME SUBSTITUTION PREPARATIONS ON DIGESTION. *(Ger.)* Hinz, A. (no affil.). *Arzneim. Forsch.* 23(6):875-879, 1973.

0701 CLINICAL AND PATHOLOGICAL ANATOMICAL FEATURES OF THE VISCERAL FORM OF HYPERPARATHYROIDISM. *(Rus.)* Sgibneva, O. V.; Arbaeva, L. I. (Volgograd Med. Inst., USSR). *Vrach. Delo* (4):110-112, 1973.

0702 ZOLLINGER-ELLISON SYNDROME CAUSED BY ISLET-CELL CARCINOMA WITH HEPATIC METASTASES: 27-YEAR SURVIVAL. *(It.)* Conte, G.; Lauro, S.; Terrible, V.; Cattano, G. (Gen. Med. Clin., Univ. Padua, Italy). *Minerva Med.* 64(12):560-572, 1973.

0703 ETIOPATHOGENESIS OF DIARRHEA SYNDROME IN PRESCHOOL CHILDREN. *(Ser.)* Parchic-Mataruga, N. (Pediatr. Dispensary, Sremski Karlovtsi, Yugoslavia). *Med. Pregled* 25(6):245-257, 1972.

0704 DIARRHOEA CAUSED BY NON-AGGLUTINABLE VIBRIO CHOLERAE (NON-CHOLERA VIBRIO). *(E.)* Zafari, Y.; Rahmanzadeh, S.; Zarifi, A. Z.; Fakhar, N. (Ministry of Health, Tehran, Iran). *Lancet* II(7826):429-430, 1973.

0705 FATAL ABDOMINAL CRISIS DUE TO SYSTEMIC THROMBOSING VASCULITIS. REPORT OF A CASE. *(E.)* Niinimaki, T.; Larmi, T. K. I.; Dammert, K. (Dept. Surg., Univ. Oulu, Finland). *Ann. Chir. Gynaecol. Fenn.* 62(1):49-51, 1973.

0706 INTESTINAL OBSTRUCTION FROM MEDICATION BEZOAR IN PATIENTS WITH RENAL FAILURE.

(E.) Townsend, C. M.; Remmers, Jr., A.; Sarles, H. E.; Fish, J. C. (Univ. Texas Med. Br., Galveston). *N. Engl. J. Med.* 288(20):1058-1059, 1973.

0707 ALIMENTARY MYCOTIC LESIONS IN CATTLE: A HISTOLOGICAL AND CULTURAL STUDY. *(E.)* Angus, K. W.; Gilmour, N. J. L.; Dawson, C. O. (Moredun Res. Inst., Edinburgh, Scotland). *J. Med. Microbiol.* 6(2):207-213, 1973.

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See also, 0270, 0272, 0303, 0370, 0459, 0462.

GENERAL

Parasitology

0772 DIETARY FACTORS AFFECTING THE PATHOGENICITY OF ENTAMOEBA HISTOLYTICA IN RATS. *(E.)* Ross, G. W.; Knight, R. (London Sch. Hyg. Trop. Med., England). *Trans. Roy. Soc. Trop. Med. Hyg.* 67(4):560-567, 1973.

Weanling Wistar albino rats given protein-deficient diets for 2-4 weeks and then infected intracecally with *Entamoeba histolytica* trophozoites were more susceptible to infection compared with controls. The proportion of infected animals developing cecal ulceration also increased. Supplementation of the low protein diet with extra carbohydrate produced an even greater infection rate but the likelihood of cecal ulceration was lower. No relation between amebic infection and the bacterial flora or pH of the cecum was noted. However, the redox potential was lower in animals developing ulceration. The mechanism by which diet affects the outcome of amebi challenge is not clear, but these results show that diet alone can affect cecal histology and the redox potential of the cecal contents. This rat model may show that dietary factors are of importance in human amebiasis.

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In 8 patients presenting with bloody diarrhea amebi asis was diagnosed promptly and accurately by sig-

moidoscopy without bowel preparation or interfering
substances and by examining fresh exudate obtained
at time of sigmoidoscopy for motile hematophagous
trophozoites of *Entamoeba histolytica*. These 8 pa-
tients, aged 18-50 yr, lived within 60 miles of Char-
lestown, South Carolina, and only 1 had recently
traveled outside the state. Six of the 8 patients
lived in rural areas where there were shallow wells
and privies for disposal of sewage; the remaining 2
patients lived in the center of the city and denied
drinking well water. Amebae were seen in only 5 of 12
pretreatment colonic mucosal biopsies. Diffuse in-
flammation, compatible with mucosal abnormalities seen
in ulcerative or granulomatous colitis, was present
in all biopsies, and was the only histopathological
abnormality in 7. Amebic serology (indirect hemagglu-
tination) was positive in all patients and prompted
a search for amebae in 2 patients who had been
erroneously diagnosed as having granulomatous colitis.
All patients treated with metronidazole experienced
clinical cures, but parasitological failure did oc-
cur. Appropriate studies to establish or exclude the
iagnosis of amebiasis should be carried out in all
patients who present with a clinical and sigmoidoscop-
c picture of colitis. Clinical and parasitological
ollow-up is recommended for patients treated with
etronidazole for amebiasis.

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10-day course of diloxanide furoate therapy (500 mg
times a day for adults and 20 mg/kg/day in 3 divi-
ed doses for children) was administered and a complete
llow-up was made on 77 of 100 individuals with
tamoeba histolytica cysts or trophozoites in at least
e stool and the absence of severe symptoms or proctos-
pic findings compatible with acute amebic dysentery.
mptoms were present in 65 patients and 12 were
ymptomatic. Parasitological and symptomatic cures
re obtained in 65 of these 77 patients, including
l 12 patients with no symptoms, for a cure rate of
%. Of the 13 patients who were not cured, complete
mptomatic improvement occurred in 5, while at least
e pretreatment symptom persisted in the remaining 8.
second course of diloxanide furoate, given to
patients with persistent amebiasis, cured 3. Ad-
nistration of diloxanide furoate also cured con-
mitant *Entamoeba hartmannii* infections in 24 of the
infected patients. Side effects of diloxanide
roate consisted of excessive flatulence (78 patients),
sea (5), anorexia (3), diarrhea (2), and mild ab-
inal cramps (2), but all patients completed the
rse of treatment without incident. Blood counts
urine analysis showed no evidence of drug-induced
anges.

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0789 TWO COMMUNITY OUTBREAKS OF HUMAN INFECTION WITH YERSINIA ENTEROCOLITICA. *(E.)* Asakawa, Y.; Akahane, S.; Kagata, N.; Noguchi, M.; Sakazaki, R.; Tamura, K. (Shizuoka Pub. Hlth. Lab., Japan). *J. Hyg. (Camb.)* 71(4):715-723, 1973.

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0791 PARASITOLOGICAL SURVEY IN A BOARDING SCHOOL: SIGNIFICANCE OF THE NUMBER OF STOOL SAMPLES EXAMINED. *(Sp.)* Schenone, H.; Galdames, M.; Rojas, A.; Inzunza, E.; Jimenez, M.; Romero, E.; Cuevas, R. (Dept. Microbiol. Parasitol., Univ. Chile, Santiago). *Bol. Chil. Parasitol.* 28 (1-2):15-16, 1973.

0792 PARASITOLOGICAL-CLINICAL EVALUATION OF THERAPEUTICAL EFFECTIVENESS OF A NEW CHEMOTHERAPEUTIC AGENT (NIFURATEL) IN THE TREATMENT OF INTESTINAL AMEBIASIS. *(Sp.)* de Figuiredo, J. C.; de Figueiredo, J. A. (Surg. Clin. Sao Luiz Hosp., Sao Paulo, Brazil). *Rev. Bras. Clin. Terap.* 2(7): 303-310, 1973.

0793 ACUTE LOCALIZED AMEBIC APPENDICITIS: REPORT OF A CASE. *(E.)* Peison, B. (Rahway Hosp., N. J.). *Dis. Colon Rectum* 16(6):532-536, 1973.

0794 PROGRESS REPORT: CHAGAS ENTEROPATHY. *(E.)* Martins Campos, J. V.; Tafuri, W. L. (Brazilian Inst. Stud. Res. Gastroenterol., Sao Paulo, Brazil). *Gut* 14(11):910-919, 1973.

See also, 0149, 0282, 0304, 0314.

GENERAL

Regional Enteritis

0795 ABSCESS AND FISTULAE IN CROHN'S DISEASE. *(E.)* Steinberg, D. M.; Cooke, W. T.; Alexander-Williams, J. (Gen. Hosp., Birmingham, England). *Gut* 14(1):865-869, 1973.

In a series of 360 patients with Crohn's disease, 65 (18%) developed an abscess and/or fistula. Of a total of 59 abscesses, 13 occurred spontaneously and the remainder in patients who had undergone a previous operation. Of 60 fistulas, 13 developed in patients who had not undergone a laparotomy; 22 occurred after resection, 8 after a bypass procedur 4 after diagnostic laparotomy, and 13 after appendectomy. Simple drainage of 33 superficial abscess was followed by a persistent fistula in 28 cases. En bloc excision of 15 deep abscesses was associate with only 1 subsequent fistula and 1 recurrent abscess. Thus, conservative surgery (simple primary closure, proximal ileostomy, bypass, and colostomy) for fistula failed in 26 of 27 operations. Excision in continuity with the diseased segment of the intestine was successful in 42 of 50 operations

These results for radical surgery compare favorably with those reported for azathioprine therapy.

0796 CIRCULATING CARCINOEMBRYONIC ANTIGEN (CEA): RELATIONSHIP TO CLINICAL STATUS OF PATIENTS WITH INFLAMMATORY BOWEL DISEASE.

(E.) Rule, A. H.; Goleski-Reilly, C.; Sachar, D. B.; Vandevoorde, J.; Janowitz, H. D. (Mount Sinai Sch. Med., New York, N.Y.). *Gut* 14(11):880-884, 1973.

Plasma levels of circulating carcinoembryonic antigen (CEA) were measured by zirconyl phosphate gel radioimmunoassay in 112 patients with chronic inflammatory bowel disease. The levels were then related to category, extent, duration, and severity of disease, as well as to the ages and surgical status of the patients. The distribution of CEA levels and their mean values were significantly raised over the levels in 33 normal control subjects, and were similar among patients with ulcerative colitis compared with those with granulomatous bowel disease. Positive values were defined as those in excess of 2.5 ng/ml. Positive assays occurred in 42% of ulcerative colitis patients, in 38% of Crohn's disease patients, and in 40% of the total group with inflammatory bowel disease. Among normal control subjects, only 3% were positive. Among inflammatory bowel disease patients, positive CEA assays occurred more frequently with more severe disease, more extensive anatomical involvement, younger ages, and shorter duration of disease. Those patients who had undergone total colectomy showed levels of circulating CEA and frequency of CEA positivity similar to those of an age-matched normal control group. CEA levels did not correspond with known cancer risk factors in patients with inflammatory bowel disease. Although rising or persisting plasma CEA values unrelated to severity and extent of disease may indicate an unfavourable prognosis in cancer, a single CEA value in patients with chronic inflammatory bowel disease is not a reliable indicator of cancer risk.

0797 EARLY COMPLICATIONS AFTER SURGICAL TREATMENT OF CROHN'S DISEASE.

(E.) Christiannsen, L.; Fischerman, K.; Nielsen, M. L. (Rigshosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 8(7):651-656, 1973.

Complications occurring in the first 10 weeks after surgery for Crohn's disease are analyzed in 68 patients (40 women and 28 men). Of the operations, 35 were primary and 33 were reoperations after primary operation in other hospitals. The most frequent complications were wound infections (31%), fistulas (29%), intra-abdominal abscesses (21%), and lung infiltrations appearing on x-ray (25%). Operative mortality was 4.4%. Postoperative intra-abdominal abscesses occurred significantly more often in patients who had a fistula or abscess before surgery. Other postoperative complications were not significantly more frequent in patients with preoperative complications. None of the complications was significantly correlated to type of operative procedure, number of operations, localization of Crohn's disease in the intestine, or preoperative treatment with corticosteroids.

0798 THE SUCCESSFUL CONSERVATIVE MANAGEMENT OF HIGH-OUTPUT ENTERO-CUTANEOUS FISTULAE.

(E.) Cocks, J.; Jones, R.; Kernutt, R.; O'Donovan, J. (Box Hill District Hosp., Melbourne, Australia). *Aust. N.Z. J. Surg.* 43(2):140-143, 1973.

Spontaneous closure of high output (1 liter/day) enterocutaneous fistulas arising in the small intestine occurred over 3-4 months in 3 patients treated by i.v. hyperalimentation. In 2 patients (men aged 32 and 69 yr), fistulas had persisted despite efforts to close leaking anastomoses surgically. The third patient (a 60-yr-old woman) would have required a difficult pancreatico-duodenectomy in the presence of sepsis; thus a conservative approach was used from the onset. The i.v. hyperalimentation involved giving more than 4000 calories/day in the form of fat, amino acids, and carbohydrates, with adequate vitamin, electrolyte, and trace element supplements. All patients recovered from long-term i.v. therapy complications that included sepsis, axillary vein thrombosis, and profuse facial flushing and fever. Other complications associated with subclavian catheters, such as pneumothorax and "lost" catheters, did not occur in these 3 cases.

0799 SERUM CARCINOEMBRYONIC ANTIGEN (CEA) IN PATIENTS WITH CHRONIC INFLAMMATORY BOWEL DISEASE.

(E.) Turner, M. D.; Kleinman, M. S.; Thayer, W. (Strong Mem. Hosp., Rochester, N.Y.). *Digestion* 9(2):116-123, 1973.

Serum carcinoembryonic antigen (CEA) in 78 patients with chronic inflammatory bowel disease was measured by a radioimmunoassay system. One of 17 patients with ulcerative proctitis, 3 of 30 with ulcerative colitis, and 4 of 31 with Crohn's disease had elevated serum CEA levels (3.5 to greater than 20 ng/ml). All patients with increased levels of CEA had symptomatic disease, but differences between serum CEA levels of symptomatic and asymptomatic patients were not statistically significant. Radiologic and other investigations showed no evidence of carcinoma of the colon in any of the 78 patients. It is unlikely that a single measurement of serum CEA by presently available methods is of value as a screening procedure for early carcinoma in patients with chronic inflammatory bowel disease. The potential value of sequential measurements remains to be determined.

0800 RESULTS FROM SURGICAL TREATMENT OF 46 PATIENTS WITH CROHN'S ILEOCOLITIS.

(Fl.) Rutgeerts, L.; De Coster, M.; Vandenbroucke, J.; Lacquet, A.; Vantrappen, G.; Beckers, J. (Natl. Fdn. Sci. Res., Louvain, Belgium). *Tijdschr. Gastroenterol.* 16(1):35-37, 47, 1973.

GENERAL

0801 AMYLOIDOSIS IN CROHN'S DISEASE. *(Fl.)* Brys, R.; Ringoir, S.; Elewaut, A.; Barbier, F. (Univ. Hosp., Ghent, Belgium). *Tijdschr. Gastroenterol.* 15(5):322-324, 1972.

0802 CARCINOMA OF THE SMALL INTESTINE IN CHRONIC REGIONAL ENTERITIS. *(E.)* Beachley, M. C.; Loebel, A.; Lankau, C. A.; Rothman, D.; Baldi, A. (Med. Coll. Virginia, Richmond). *Am. J. Dig. Dis.* 18(12):1095-1098, 1973.

0803 TREATMENT OF CROHN'S DISEASE WITH BCG ACCORDING TO GEFFROY'S METHOD. REPORT OF 8 CASES. *(Fr.)* Rachail, M.; Pellet, D.; Bruttmann, G.; Coulomb, M.; Faure, H. (Med. Clin. Grenoble, France). *Sem. Hop. Paris* 49(46):3067-3071, 1973.

0804 RADIOGRAPHIC ABNORMALITIES IN A WOMAN WITH CHRONIC INFLAMMATORY BOWEL DISEASE. *(E.)* Wheelock, F. C.; Vickery, A. L. (Harv. Med. Sch., Cambridge, Mass.). *N. Engl. J. Med.* 289(17):906-911, 1973.

0805 MASSIVE GASTROINTESTINAL HEMORRHAGE AS THE SOLE CLINICAL MANIFESTATION OF REGIONAL ENTERITIS. *(E.)* Corona, F. E.; Dyck, W. P. (Scott White Clin., Temple, Tex.). *Am. J. Dig. Dis.* 18(11):1001-1004, 1973.

0806 PROTEIN-LOSING ENTEROPATHY AND MALABSORPTION IN REGIONAL ENTERITIS: CURE BY LIMITED ILEAL RESECTION. *(E.)* Warshaw, A. L.; Waldmann, T. A.; Laster, L. (Massachusetts Gen. Hosp., Boston). *Ann. Surg.* 178(5):578-580, 1973.

0807 RADIOLOGICAL ASPECTS OF THE RECURRENCE OF GRANULOMATOUS ILEOCOLITIS. *(Fr.)* Cherigie, E.; Monnier, J.; Donelli, G. (Saint-Antoine Hosp., Paris, France). *Ann. Radiol.* 16(7-8):433-447, 1973.

0808 SOME ASPECTS OF CROHN'S DISEASE. *(E.)* Javette, S. L.; Kavin, H.; Bremner, C. G.; Schneider, J.; Levine, E.; Hinder, R. A. (Johannesburg Gen. Hosp., South Africa). *S. Afr. Med. J.* 47(31):1400-1406, 1973.

See also, 0265, 0448.

NUMBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

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GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism a Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal trac Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized complilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1975.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *World Medical Periodicals*, 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	It.	Italian
Ar.	Arabic	Jap.	Japanese
Bul.	Bulgarian	Kor.	Korean
Ch.	Chinese	Latv.	Latvian
Cz.	Czech	Lith.	Lithuanian
Dan.	Danish	Nor.	Norwegian
Dut.	Dutch	Pol.	Polish
E.	English	Por.	Portuguese
Eston.	Estonian	Rum.	Rumanian
Fin.	Finnish	Rus.	Russian
Fl.	Flemish	Ser.	Serbo-Croatian
Fr.	French	Sl.	Slovak
Ger.	German	Sp.	Spanish
Gr.	Greek	Sw.	Swedish
Heb.	Hebrew	Th.	Thai
Hun.	Hungarian	Turk.	Turkish
Ic.	Icelandic	Uk.	Ukrainian
In.	Indonesian	Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	mC,µC	milli-,microcurie(s)
ADP	adenosine diphosphate	mg	milligram(s)
AMP	adenosine monophosphate	min	minute(s)
ATP	adenosine triphosphate	ml	milliliter(s)
BSP	sulfobromophthalein	mm	millimeter(s)
C	degrees centigrade	MTD	maximum tolerated dose
cm	centimeter(s)	ng	nanogram (10^{-9})
CNS	central nervous system	pg	picogram (10^{-12})
cpm	counts per minute	p.o.	orally
DNA	deoxyribonucleic acid	ppm	parts per million
e.g.	for example	r	Roentgen
g	gram(s)	RBC	red blood cells (erythrocytes), red blood count
µg	microgram(s)	resp.	respectively
hr	hour(s)	Rev.	review (only in citations)
i.m.	intramuscular	RNA	ribonucleic acid
i.p.	intraperitoneal	s.c.	subcutaneous
IU	international unit(s)	sec	second(s)
i.v.	intravenous	SGOT	serum glutamic-oxalacetic transaminase
kg	kilogram(s)	SGPT	serum glutamic-pyruvic transaminase
LD_{50}	median lethal dose(s)	U	unit(s)
LDH	lactic acid dehydrogenase	UV	ultraviolet
m	meter(s)	WBC	white blood cells (leukocytes), white blood count
M	molar	yr	year(s)
mEq	milliequivalent(s)		
mM	millimolar		
µM	micromolar		

NOTE

Due to circumstances beyond our control, Gastroenterology Abstracts and Citations, Volume 7, Number 4, April 1973 inadvertently was mailed to another mailing list. We have arranged for additional copies to be printed and mailed to the Gastroenterology Abstracts and Citations mailing list. This should occur in the very near future.

We regret this inconvenience to our readers, and this office will continue surveillance to make sure that this issue will be mailed out correctly as soon as possible.

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

0809 FAILURE OF PHENOBARBITAL AND MARIJUANA TO STIMULATE THE SMOOTH ENDOPLASMIC RETICULUM IN THE HUMAN INTESTINAL ABSORPTIVE CELL. *(E.)* Tytgat, G. N.; Saunders, D. R.; Rubin, C. E. (Dept. Med., Univ. Amsterdam, Netherlands). *Eur. J. Clin. Invest.* 3(4):363-370, 1973.

Phenobarbital (5-7 mg/kg/day, p.o., for 3-5 consecutive days) was given to 7 healthy volunteers who had been on a metabolic diet for at least 10 days and continued on that diet for 10 more. Each of 3 additional volunteers smoked up to 4 marijuana cigarettes/day, i.e., about 10-15 mg Δ 9-tetrahydrocannabinol/day. Diet was maintained similarly in all volunteers. A total of 180 intestinal biopsies were taken. The results indicated that there is no constant unequivocal increase in the percentage of electron micrograph pictures with a high number of microsomal profiles during the period of phenobarbital administration or during marijuana smoking. No significant increase in the average percentage of smooth endoplasmic reticulum hits occurred during the phenobarbital administration. No constant increase or decrease in microsomal protein content was observed during and after administration of phenobarbital or during and after smoking marijuana. No significant variations in alkaline phosphatase activity or in serum cholesterol and triglyceride levels were observed during these experiments. Moreover, the lipoprotein electrophoretic pattern did not reveal substantial changes during the pharmacological experiments. These results contrast with the susceptibility of the hepatocyte to smooth endoplasmic reticulum induction by phenobarbital.

0810 A STEREOLOGICAL STUDY OF INTRAHEPATIC BILE DUCTS. I. METHOD AND APPLICATION TO NORMAL LIVERS. *(E.)* Jorgensen, M. (Inst. Path., Copenhagen, Denmark). *Acta Pathol. Microbiol. Scand. (A)* 81(5):657-662, 1973.

Intrahepatic bile ducts in tissue from 10 autopsies were examined by the stereological method. The material comprised liver tissue from 5 newborn children and 5 adults, aged 22, 31, 49, 60, and 65 yr; none of these patients had evidence of liver or biliary disease. Tissue, fixed in formalin and embedded in paraffin, was cut in 5-10 μm thick sections, which were stained with hematoxylin and eosin. Profiles (100) of sectioned bile ducts were drawn on tracing paper by means of a Leitz device, so that all ducts in a randomly chosen path were drawn. Each profile was numbered and its largest and shortest diameter measured in mm. From these figures the axial ratio was calculated. There was no systematic difference in axial ratio distribution with respect to age in the adult group, and no difference between children and adults. The profiles show that throughout life bile ducts in normal liver have a shape approximating a circular cylinder. The course of the ducts is straight over long segments. Partial parallelism is not a marked feature. Mean duct diameter increases slightly from the newborn period to adult life. Stereology is applicable to the distinction between relatively unrelated duct forms and their appearance in histologic slides. The method is less suitable for determination of ductal shape.

0811 LIGHT, FLUORESCENCE AND ELECTRON MICROSCOPIC STUDIES OF LYMPHOID CELLS IN THE SMALL INTESTINAL EPITHELIUM OF MICE. *(E.)* Glaister, J. R. (Nuffield Unit Lab. Animal Path., Edinburgh Univ., Scotland). *Int. Arch. Allergy Appl. Immunol.* 45(6): 854-867, 1973.

The lymphoid cells in the epithelium covering the villi of the small intestinal epithelium of the C3H mouse were examined by light, fluorescence, and electron microscopy. The population has a heterogeneous morphology with small and medium-sized lymphocytes predominating. Large lymphocytes and various types of pyroninophils are less common. The fate of these cells is also diverse; a small proportion degenerates, some migrate back into the lamina propria, and the remainder are probably lost into the lumen of the intestine. The presence of blast cells, blast cell-lymphocyte interaction, and limited antibody production suggests that an active immunological reaction is taking place in the epithelium. Whether the large number of non-pyroninophils in the epithelium are also involved in this reaction, or whether they have a different immunological function is not known.

0812 DEMONSTRATION OF FIBROUS COMPONENTS IN HEPATIC INTERPHASE NUCLEI BY HIGH RESOLUTION SCANNING ELECTRON MICROSCOPY. *(E.)* Tanaka, K.; Iino, A. (Tottori Univ. Sch. Med., Yonago, Japan). *Exp. Cell Res.* 81(1973):40-46, 1973.

Fibrous components were observed in the interphase nuclei of rabbit liver cells fixed with $KMnO_4$, split by the frozen-resin cracking method, and examined by high-resolution scanning electron microscopy. A fiber 350-700 Å in diameter was formed of about 250 Å coiled fibrils which were themselves formed of 100-150 Å supercoiled subfibrils. The fibers in the interphase nuclei were quite irregular in their arrangement, coiling to form greater fibers and twisting about one another like rope. The fibrous components appear compatible with the so-called chromatin fiber observed by whole-mount electron microscopy.

0813 THE FINE STRUCTURAL LOCALIZATION OF ALKALINE PHOSPHATASE ACTIVITY OF INTESTINAL MICROVILLI IN THE DEVELOPING CHICK EMBRYO. *(E.)* Ono, K. (Iwate Med. Univ., Morioka, Japan). *Acta Anat.* 86(1):71-82, 1973.

Fine structures and the development of the alkaline phosphatase activity of intestinal microvilli in the chick embryo were investigated electron microscopically. A primitive surface projection of the microvilli first appears in the duodenal and the jejunal cell surface of the 8-day chick embryo. The microvillous projections of the ileal epithelium are barely seen before the 10-day incubation stage. With the advance of embryonal stages, these primitive microvilli become increasingly numerous, regular in size, and finally project in a perpendicular direction from the free surface of the epithelium. When a mixture of 1-naphthyl phosphate and hexazotized pararosanilin was perfused intraluminally into the small intestine of living embryos, alkaline phosphatase reaction products appeared on the membrane of primitive projections of the duodenal and jejunal epithelium in the 8-day chick embryo. In the ileal epithelium, there was also definite, although very weak, alkaline phosphatase activity by this stage of development. After 20 days of incubation, alkaline phosphatase activity increased rapidly on the microvilli of the ileum, so that little difference was recognizable in the enzyme activity between the duodenum, jejunum, and ileum at the stage just before hatching. In glutaraldehyde-fixed material, azo-dye deposits are first detected on duodenal microvilli of the 14-day embryo. After 20 days of incubation, intensities of the alkaline phosphatase activity, as revealed in the glutaraldehyde-fixed small intestine, were essentially comparable with those revealed by the intravital perfusion method.

0814 PARENCHYMAL CELLS FROM ADULT RAT LIVER IN NONPROLIFERATING MONOLAYER CULTURE. II. ULTRASTRUCTURAL STUDIES. *(E.)* Chapman, G. S.; Jones, A. L.; Meyer, U. A.; Bissell, D. M. (VA Hosp., San Francisco, Calif.). *J. Cell Biol.* 59(3):735-747, 1973.

Hepatic parenchymal cells from adult rats, established *in vitro* as a monolayer, were evaluated by electron microscopy. Within 24 hr after the initial seeding, the incubated cells were polygonal and in close apposition with 3 to 6 neighboring cells. The ultrastructure of the monolayer cells was examined at this time and after 3 and 10 days of incubation. With the exception of a few enlarged mitochondria, organelles in both the 1- and 3-day monolayer cells were indistinguishable quantitatively and morphologically from those in the intact liver. After 10 days of incubation, however, the rough-surfaced endoplasmic reticulum had become dilated and vesiculated. In all cells studied, portions of the rough endoplasmic reticulum were found in a close spatial relationship to mitochondria. The observed frequency of this association supports previous suggestions that the organelle complex may represent a functional unit necessary for new membrane formation. The Golgi complexes of 1- and 3-day cells contained very low density lipoprotein-sized particles, which suggests that the monolayer cells synthesize lipoproteins. These electron microscope observations demonstrate that adult hepatic parenchymal cells in monolayer retain for several days the subcellular structural elements characteristic of normally functioning hepatocytes.

0815 EFFECTS OF SINGLE-DOSE PARTIAL-BODY X-IRRADIATION ON CELL PROLIFERATION IN THE MOUSE SMALL INTESTINAL EPITHELIUM. *(E.)* Lesher, J.; Lesher, S. (Allegheny Gen. Hosp., Pittsburgh, Pa.). *Radiat. Res.* 57(1):148-157, 1974.

The effects of partial body, single-dose, x-irradiation on the cell kinetics of the mouse small intestine were studied in male 100-day-old C57Bl/6J mice. Irradiation of the intestinal region with exposure of 300, 600, or 900r and with the anterior part of the mouse shielded produced changes in the epithelial cells of the small intestine which were similar in character to that observed with whole-body irradiation but were less severe and recovery took place more rapidly. The recovery was related to an increase in the proliferative population and an acceleration of the cell cycle. The increased proliferative population persisted longer in the partially shielded animals. The quantitative differences between the effects produced by lower partial-body (x-irradiation) as opposed to whole-body gamma-irradiation must be a reflection of more effective repair and/or better recovery. The only significant difference between the mice exposed to abdominal irradiation and those given whole-body irradiation is that in mice exposed to radiation to the abdomen alone all the organs in the anterior half of the animal received no irradiation. Therefore, it appears that the effects of irradiation on one organ system may possibly be modified by some factor or factors emanating from an unirradiated organ system.

0816 INFLUENCE OF VAGOTOMY ON PARIETAL CELL KINETICS IN THE RAT GASTRIC MUCOSA. *(E.)* Ley, R.; Willems, G.; Vansteenkiste, Y. (St. Pierre Univ. Hosp., Brussels, Belgium). *Gastroenterology* 65(5):764-772, 1973.

Four successive i.p. injections of ^{3}H-thymidine were performed in male Sprague-Dawley rats submitted to vagotomy and pyloroplasty, to pyloroplasty alone, or to sham operation. From 3 to 5 animals of each group were killed at intervals after these injections and the rate of appearance of labeled parietal cells in the fundic mucosa was studied autoradiographically. The percentages of labeled parietal cells observed after the 19th and 30th day were significantly lower in the vagotomized animals than in the control animals. This indicates that in rats, the production of young parietal cells is decreased after vagotomy. In a control experiment, DNA synthesis and mitotic indices were compared in rats submitted to one or the other of the three surgical procedures by using single injections of ^{3}H-thymidine. A slight increase in both parameters was observed in the fundic mucosa of the vagotomized animals. Thus, no decrease in mitotic activity of the fundic progenitor cells could explain the retarded parietal cell production after vagotomy.

0817 AUTORADIOGRAPHIC STUDIES OF LYMPHOID CELLS IN THE SMALL INTESTINAL EPITHELIUM OF THE MOUSE. *(E.)* Glaister, J. R. (Nuffield Unit Lab. Animal Path. Edinburgh Univ., Scotland). *Int. Arch. Allergy Appl. Immunol.* 45(6):844-853, 1973.

The labeling index of the lymphoid cell population in the small intestinal epithelium of the C3H mouse was

determined at various time intervals after single or
multiple i.p. injections of tritiated thymidine.
The results show that the population is composed on
both short-lived and long-lived lymphoid cells. The
generation time of short-lived cells was estimated
at 10-14 hr. Although the long-lived lymphocytes
appear to have a generation time in the order of
months, the actual number of these cells present in
the epithelium declines fairly rapidly with a half-
life of approximately 7 days. The function of the
short-lived population is unknown. Since the short-
lived cells include both pyroninophils and small and
edium-sized lymphocytes, both humoral and cellular
mmune responses can be taking place in the epithelium,
he former being seen as pyroninophilic cells equi-
alent to those of the germinal centers and plasma
ell precursors, the latter manifesting themselves
s migrating newly formed small lymphoid cells into
he epithelium. There is a relatively small long-
ived lymphocyte population in the epithelium. The
ymphoid cell population in the intestinal epithelium
ay be a complex immunological system which monitors
nd responds to a variety of antigenic stimuli in
r near the epithelium, forming part of the in-
estinal defense mechanism.

818 EMBRYOGENESIS OF THE ENTERIC GANGLIA IN
NORMAL MICE AND IN MICE THAT DEVELOP CON-
ENITAL AGANGLIONIC MEGACOLON. *(E.)* Webster, W.
Dept. Anat., Univ. Virginia, Charlottesville).
. *Embryol. Exp. Morphol.* 30(3):573-585, 1973.

he development of the enteric plexus in normal mice
nd in mice who develop aganglionic megacolon due to
he recessive gene piebald-lethal was examined by
erial frozen sections stained for esterase activity.
ontrary to the classical concept, all the enteric
anglia are from a single, vagal, neural crest source.
he immature ganglion cells first enter the gut by
y of the newly formed vagal outgrowth at 10 days
estation. The neuroblasts then migrate down the
t in a cranio-caudal direction, being replaced by
re neuroblasts from the vagus. By 15 days 12 hr
e process is complete and ganglion cells are
esent throughout the gut. The process is continuous
d there is no evidence of a lumbosacral origin for
y of the intramural ganglia. In mice which develop
anglionic megacolon the process is basically the
me except that the neuroblasts migrate at a slower
te than normal. The result is that the migration
the neuroblasts and the elongation of the gut are
t of phase so the migrating neuroblasts cannot
ach the end of the gut despite the fact they migrate
7 days longer than normal.

19 MATURATION OF GOBLET CELLS OF THE
MOUSE SMALL INTESTINE AS SHOWN BY
E UPTAKE OF ^{35}S-SODIUM SULFATE. *(E.)*
rzel, J.; Almeida, M. L. P. (Fac. Odontolgia
Piracicaba, S. P., Brazil). *Anat. Rec.*
7(4):519-524, 1973.

maturation of goblet cells of the small in-
tine was studied in male adult Swiss mice.
mice fed *ad libitum* were given a single i.p. injection of ^{35}S-sodium sulfate and sacrificed 1, 3, and 6 hr later. Plastic-embedded 1μ thick sections from duodenum, jejunum and ileum were radioautographed and the uptake of the ^{35}S by goblet cells was analyzed. Goblet cells of the small intestine originate in crypts and migrate to villi tips where they are released into the intestinal lumen. Radioautographic reaction appeared over all goblet cells, whether in the crypts or in the villi, indicating continual synthesis of sulfomucins. Analysis of counts over goblet cells at different levels of crypts and villi revealed that the cells of duodenum and jejunum become more active in sulfomucin synthesis, when they reach the upper half of the villi. In the ileum, although a similar maturation may occur, the results were not statistically significant.

0820 THE DEVELOPMENT OF THE DUODENAL MUCOSA OF THE CHICK FOLLOWING EXPOSURE TO 700r OF IONIZING RADIATION. *(E.)* Verzosa, Jr., V. S. (Coll. Med., Northwestern Univ., Chicago, Ill.). *Acta Med. Philippina* 9(1):18-49, 1973.

0821 SIALOGRAPHIC APPEARANCES OF THE NORMAL PAROTID GLAND. *(E.)* Ericson, S. (Dept. Oral Roentgenol., Umea Univ., Sweden). *Acta Radiol. Diagn.* 14(5):593-612, 1973.

0822 FINE STRUCTURE OF THE DIFFERENTIATING ACINI IN SUBMANDIBULAR GLANDS OF ISOPROTERENOL-TREATED RATS. *(E.)* Bressler, R. S. (Mt. Sinai Sch. Med., New York, N.Y.). *Am. J. Anat.* 138(4):431-448, 1973.

0823 PREPARATION OF INTESTINE AND OTHER ELONGATED SPECIMENS FOR HISTOLOGIC AND IMMUNOFLUORESCENT STUDIES. *(E.)* Loria, R. M.; Kibrick, S.; El-Bermani, A.; Broitman, S. A. (Boston Univ. Sch. Med., Mass.). *Am. J. Clin. Pathol.* 60(3):424-427, 1973.

0824 HEMATOPOIETIC TISSUE IN THE FOETAL LIVER OF THE RAT AT THE END OF GESTATION. IV. REPERCUSSIONS OF ITS EVOLUTION ON THE RED CELL POPULATION OF THE FOETAL BLOOD. *(Fr.)* Nagel, J. (Lab. Animal Physiol., Fac. Sci., Reims, France). *Arch. Anat. Microsc. Morphol. Exp.* 61(3):301-312, 1972.

0825 THE DIAPHRAGMATIC AND HEPATIC LYMPH VESSELS. *(Fr.)* Hidden, G.; Padovani, J.; Desvignes, G.; Berteaux, D. (U.E.R. Biomed. St. Peres, Paris, France). *Arch. Anat. Pathol. (Paris)* 21(4):349-354, 1973.

0826 NORMAL SIZE OF LIVER IN INFANCY AND CHILDHOOD. X-RAY STUDY. *(E.)* Deligeorgis, D.; Yannakos, D.; Doxiadis, S. (Inst. Child Health, Athens, Greece). *Arch. Dis. Child.* 48(10):790-793, 1973.

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

0827 MORPHOLOGICAL AND HISTOCHEMICAL STUDY OF THE EMBRYONIC LIVER AT VARIOUS STAGES OF DEVELOPMENT AFTER ADMINISTRATION OF CARBON TETRACHLORIDE. *(Rus.)* Tsirel'nikov, N. I.; Dobrovol'skaia, S. G. (Novosibirsk Med. Inst., USSR). *Biull. Eksp. Biol. Med.* 76(12):95-97, 1973.

0828 CYTOCHEMICAL OBSERVATIONS WITH THE ELECTRON MICROSCOPE ON THE GALLBLADDER EPITHELIUM. *(It.)* Inferrera, C.; Ferlazzo, A.; Barone, P. (Inst. Anat. Pathol. Histol., Univ. Messina, Italy). *Boll. Soc. Ital. Biol. Sper.* 49(1/2):17-20, 1973.

0829 HISTOCHEMICAL OBSERVATIONS ON GASTRIC GLAND DIFFERENTIATION IN MAN. *(It.)* Millo, R.; Franzi, A. T. (Inst. Normal Human Anat., Univ. Genoa, Italy). *Boll. Soc. Ital. Biol. Sper.* 49(1/2):34-40, 1973.

0830 ANATOMICAL AND FUNCTIONAL REPERCUSSIONS OF LOCALIZED IRRADIATION OF THE INTESTINE. *(Fr.)* Santini, R.; Brard, E.; Killian, J. (Lab. Physiol. Pharmacodynamics, Natl. Inst. Applied Sci., Lyon, France). *C. R. Soc. Biol. (Paris)* 167(6/7):992-996, 1973.

0831 ANATOMY OF THE PERINEAL BODY. *(E.)* Oh, C.; Kark, A. E. (Mt. Sinai Sch. Med., New York, N.Y.). *Dis. Colon Rectum* 16(6):444-454, 1973.

0832 PARTITION OF RAT LIVER CELLS IN AQUEOUS DEXTRAN-POLYETHYLENE GLYCOL PHASE SYSTEMS. *(E.)* Watter, H.; Krob, E. J.; Ascher, G. S.; Seaman, G. V. F. (VA Hosp., Long Beach, Calif.). *Exp. Cell Res.* 82(1):15-26, 1973.

0833 PREPARATION OF RAT LIVER CELLS. III. ENZYMATIC REQUIREMENTS FOR TISSUE DISPERSION. *(E.)* Seglen, P. O. (Norsk Hydro's Inst. Cancer Res., Oslo, Norway). *Exp. Cell Res.* 82(2):391-398, 1973.

0834 A CONTRIBUTION TO THE HISTOGENESIS OF THE OESOPHAGEAL EPITHELIUM IN MAMMALS. *(E.)* Sevcenko, G.; Vacek, Z. (Fac. Med., Charles Univ., Prague, Czechoslovakia). *Folia Morphol. (Praha)* 21(3):261-264, 1973.

0835 DIFFERENTIATION OF THE LARGE SALIVARY GLANDS OF THE RAT. *(E.)* Pospisilova-Zuzakova, V. (Fac. Med., Comenius Univ., Bratislava, Czechoslovakia). *Folia Morphol. (Praha)* 21(4):404-405, 1973.

0836 LYMPH DRAINAGE OF THE STOMACH IN MAN AND CERTAIN MAMMALS. *(E.)* Durovicova, J.; Munka, V. (Fac. Med., Safarik Univ., Kosice, Czechoslovakia). *Folia Morphol. (Praha)* 21(4):411-413, 1973.

0837 RELATION OF THE ACCESSORY PANCREATIC DUCT TO THE DUODENAL MUSCULARIS IN MAN. *(E.)* Stelmasiak, M.; Karski, J. (Med. Acad., Lubin, Poland). *Folia Morphol. (Warsz.)* 32(4):407-411, 1973.

0838 HISTOCHEMICAL ACTIVATION OF RAT-LIVER LYSOSOMES BY DIMETHYL SULFOXIDE. *(E.)* Misch, D. W.; Misch, M. S. (Dept. Zool., Univ. North Carolina, Chapel Hill). *Histochemie* 37(2):131-140, 1973.

0839 PARENCHYMAL CELLS FROM ADULT RAT LIVER IN NONPROLIFERATING MONOLAYER CULTURE. I. FUNCTIONAL STUDIES. *(E.)* Bissell, D. M.; Hammaker, L. E.; Meyer, U. A. (Dept. Med., Univ. California, San Francisco). *J. Cell Biol.* 59(3):722-734, 1973.

0840 FACTORS AFFECTING THE LYMPHOID CELLS IN THE SMALL INTESTINAL EPITHELIUM OF THE MOUSE. *(E.)* Glaister, J. R. (Nuffield Unit Lab. Animal Pathol., Edinburgh Univ., Scotland). *Int. Arch. Allergy* 45(5):719-730, 1973.

0841 A CONTRIBUTION TO THE STUDY OF THE ARCHITECTURE OF THE AUTONOMIC NERVOUS SYSTEM OF THE DIGESTIVE TRACT OF THE RAT. *(E.)* van Driel, C.; Drukker, J. (Anat. Embryol. Inst., Univ. Amsterdam, Netherlands). *J. Neural Transmission* 34(4):301-320, 1973.

0842 PANETH CELLS AND GOBLET CELLS. *(E.)* Subbuswamy, S. G. (Grant Med. Coll., Bombay, India). *J. Pathol.* 111(3):181-189, 1973.

0843 TWO MORPHOLOGICALLY DIFFERENT MITOCHONDRIAL POPULATIONS IN THE RAT HEPATOCYTE AS DETERMINED BY QUANTITATIVE THREE-DIMENSIONAL ELECTRON MICROSCOPY. *(E.)* Berger, E. R. (VA Hosp., Brooklyn, N.Y.). *J. Ultrastruct. Res.* 45(5/6):303-327, 1973.

See also, 0884, 0928, 0951, 0963, 1054, 1080, 1099, 1103, 1106, 1114, 1122, 1187, 1234, 1293, 1430, 1443, 1444.

0844 INHIBITION OF ILEAL WATER ABSORPTION BY INTRALUMINAL FATTY ACIDS: INFLUENCE OF CHAIN LENGTH, HYDROXYLATION, AND CONJUGATION OF FATTY ACIDS. *(E.)* Ammon, H. V.; Phillips, S. F. (Med. Coll. Wisconsin, Wood). *J. Clin. Invest.* 53(1):205-210, 1974.

The influence of fatty acids on ileal absorption of water, electrolytes, glucose, and taurocholate was examined in Thiry-Vella fistulas in 5 mongrel dogs. Fatty acid absorption also was measured. Segments of terminal ileum were perfused at steady state with isotonic electrolyte solutions containing 11.2 mM glucose, 4.5 mM taurocholate, and 0.1-5.0 mM fatty acid. Three C_{18} fatty acids, oleic acid, 10(9)-hydroxy-stearic acid, and ricinoleic acid, completely inhibited water absorption at 5 mM. Sodium, chloride, and potassium absorptions were inhibited in parallel with absorption of water. At 1 mM, ricinoleic acid was significantly more potent than oleic acid; the effect of 1 mM 10(9)-hydroxy-stearic acid was intermediate. Dodecanoic and decanoic acids were as effective as C_{18} fatty acids at 5 mM but octanoic and hexanoic acids were ineffective. The polar group of C_{18} fatty acids was modified by conjugating oleic and ricinoleic acids with taurine. When these compounds and a substituted C_{10} fatty acid, *p-n*-decylbenzenesulfonate, were perfused, water absorption was also inhibited. Short-chain fatty acids (C_3 and C_4) and their hydroxylated derivatives were ineffective at 5 mM. When water absorption was inhibited, absorption of glucose and taurocholate was decreased. The phenomenon of inhibition of water and electrolyte absorption by fatty acids may be relevant to steatorrhea and diarrhea in man.

0845 THE INFLUENCE OF PROTEIN MALNUTRITION ON ILEAL PERMEABILITY TO MACROMOLECULES IN THE RAT. *(E.)* Worthington, B. S.; Boatman, E. S. (Sch. Public Hlth. Community Med., Univ. Washington, Seattle). *Am. J. Dig. Dis.* 19(1):43-55, 1974.

Ileal absorption of intact protein was assessed in groups of control and protein-deficient Sprague-Dawley rats during a 5-month period of dietary protein restriction. At monthly intervals following diet initiation, 3 animals from both the control and deficient groups were administered horseradish peroxidase via ligated ileal loops either 15, 45, or 90 min before loop excision and processing for light and electron microscopy. Morphological evaluations revealed no change in pinocytotic activity during the 5 months of progressive protein malnutrition. After 3 months, however, partial deterioration of mucosal structure was observed with apparent separation of apical intercellular junctions and movement of peroxidase molecules directly between cells. Thus, the ileal epithelium, unlike its jejunal counterpart, does not respond to protein deficiency by increased pinocytotic activity but shows signs of intercellular barrier deterioration. Loss of intestinal barrier function to macromolecules might provide an intercellular pathway by which toxic substances from the distal small intestine enter the mucosa. Such a phenomenon could explain the severity of diarrhea in children with protein malnutrition.

0846 ION TRANSPORT IN RABBIT ILEAL MUCOSA. IV. BICARBONATE SECRETION. *(E.)* Dietz, J.; Field, M. (Harvard Med. Sch., Boston, Mass.). *Am. J. Physiol.* 225(4):858-861, 1973.

Secretion of HCO_3 by isolated New Zealand male rabbit ileal mucosa was studied under control conditions in the presence of dibutyryl cyclic AMP and in the presence of epinephrine. Tissues were clamped in low-volume Ussing chamber systems and bathed with 25 mM HCO_3-Ringer gassed with 5% CO_2 in O_2. HCO_3 concentration changes were determined by acidification and back-titration and volume changes were determined by counting ^{3}H-insulin. Luminal alkalinzation and serosal acidification were observed under control conditions and in the presence of dibutyryl cyclic AMP, the change being similar for both. Epinephrine abolished this apparent HCO_3 secretion. In all three cases, serosal acidification was greater than luminal alkalinization. Lactate measurements suggested that this difference was due to preferential release of lactic acid on the serosal side. The magnitudes of the net HCO_3 fluxes were in the ranges of previously measured residual ion fluxes. The results suggest that 1) HCO_3 is actively secreted by the ileum; 2) dibitutyryl cyclic AMP does not significantly increase the rate of secretion; 3) epinephrine abolishes net HCO_3 secretion; and 4) the residual ion flux is due predominantly to net HCO_3 secretion.

0847 ELECTROLYTE TRANSPORT IN RABBIT ILEUM. *(E.)* Binder, H. J.; Powell, D. W.; Tai, Y. H.; Curran, P. F. (Yale Univ. Sch. Med., New Haven, Conn.). *Am. J. Physiol.* 225(4):776-780, 1973.

Na and Cl transport across rabbit ileum *in vitro* was studied using a variety of bathing solutions. In solutions containing Cl and/or HCO_3, short-circuit current (I_{sc}) was always greater than net Na flux, but in Cl-HCO_3-free solution (Cl and HCO_3 replaced by isethionate) net Na flux was greater than I_{sc}. Addition of HCO_3 to the bathing solutions in the presence or absence of Cl caused a decrease in net Na absorption with little change in I_{sc}, and addition of HCO_3 in the presence of Cl caused a decrease in net Cl secretion. Addition of Cl in the presence or absence of HCO_3 caused an increase in Isc but little change in net Na flux. There was no set flux of Cl in Na-free solution. These observations are consistent with the presence of two ion transport systems in the ileum, one mediating Na absorption and one mediating electrolyte secretion. The secretory system could involve either electrogenic anion transport or neutral transport of NaCl and/or $NaHCO_3$, but detailed examination of the results suggests that the latter may be somewhat more likely.

0848 COUNTERCURRENT MULTIPLICATION OF SODIUM IN INTESTINAL VILLI DURING ABSORPTION OF SODIUM CHLORIDE. *(E.)* Haljamae, H.; Jodal, M.; Lundgren, O. (Dept. Histol., Univ. Goteborg, Sweden). *Acta Physiol. Scand.* 89(4):480-493, 1973.

Sodium and potassium concentrations in the villous tissue, expressed as μg Na or K/mg tissue protein, were determined *in vivo* in anesthetized cats along the villous length during the absorption of isotonic saline solutions. Sodium concentrations were 3-4 times higher at the tip than at the villous base. The addition of 30 mmol glucose to the incubation medium increased the sodium concentration along the villous length, while this gradient was drastically decreased by ischemia or intense vasodilatation as well as by intra-arterial infusion of ouabain. The intracellular sodium and potassium concentrations at the villous base were calculated at 21 to 125 mEq/liter, resp., during isotonic saline absorption. The extracellular sodium concentration at the villous tip was estimated at 300-900 mEq/liter, corresponding to an interstitial osmolarity of 600-1600 milliosmol/liter. It is proposed that a countercurrent multiplication of sodium occurs in the villi resulting in a high interstitial osmolarity at the villous tip. The countercurrent multiplication of sodium, occurring during the absorption of sodium chloride, is of major importance for the absorption of water, particularly when this occurs against a luminal to tissue osmotic gradient. Absorption of any solute that increases plasma osmolarity in the villous capillary network would likely cause a transfer of water from villous central artery to villous capillaries. This, in turn, would lead to a high sodium chloride concentration in the extracellular space of the villous tip, enhancing water absorption.

0849 ION TRANSPORT IN RABBIT ILEAL MUCOSA. III. EFFECTS OF CATECHOLAMINES. *(E.)* Field, M.; McColl, I. (Harvard Med. Sch., Boston, Mass.). *Am. J. Physiol.* 225(4):852-857, 1973.

Effects of epinephrine and norepinephrine on ion transport in isolated rabbit ileal mucosa were studied in HCO_3-containing (25 mM HCO_3, 5% CO_2) and HCO_3-free (no HCO_3 or CO_2) Ringer solutions. In HCO_3-Ringer, epinephrine and norepinephrine (0.05 mM) produced rapid and sustained decreases in short-circuit current of more than 100 microampere/cm^2. In HCO_3-free Ringer (present on both sides of the mucosa or only on the luminal side), the decreases in short-circuit current were much smaller. In both Ringer solutions, norepinephrine reversed the increase in short-circuit current produced by theophylline but not that produced by cyclic AMP or its dibutyryl analogue. These short-circuit current changes did not occur with isoproterenol, were unaffected by propranalol, and were partially reversed by phentolamine, suggesting that they are alpha-adrenergic in nature. Na and Cl flux measurements demonstrated the following effects of epinephrine and norepinephrine in HCO_3-Ringer: an increase in net mucosa- (M) to-serosa (S) Na flux due to an increase in M-to-S unidirectional flux; an increase in net M-to-S Cl flux due both to an increase in M-to-S and a decrease in S-to-M unidirectional fluxes; and disappearance of the residual ion flux. Most of the short-circuit current change was due to the last of these effects. These effects were not seen in HCO_3-free Ringer. It is concluded that stimulation of alpha-adrenergic receptors in the ileal mucosa enhances active absorption of Na and Cl and reduces short-circuit current, probably by inhibiting net HCO_3 secretion.

0850 INFLUENCE OF FLOW RATE ON THE KINETICS OF ABSORPTION OF GLUCOSE AND LYSINE IN CHILDREN. *(E.)* Rey, F.; Driller, F.; Schmitz, J.; Rey, J. (Hosp. Enfants Malades, Paris, France). *Gastroenterology* 66(1):79-85, 1974.

The influence of flow rate on the kinetics of glucose and lysine absorption was studied in 20 normal children, aged 7 months to 5 yr, by using a double lumen tube. Absorption values at 7.5 ml/min were approximately twice those at 3.6 ml/min. The glucose concentration gradient between the proximal and distal orifices was not reduced at the lowest concentrations (18, 36, and 72 mM glucose infused) when the flow rate was increased from 3.6 to 7.5 ml/min. At the highest concentrations (135 and 270), increased flow rate produced a significant reduction of the concentration gradient. the lysine concentration gradient was not significantly modified by altering flow rate. In these conditions, perfusion rate does not increase the surface of mucosa really perfused. This effect is related to modifications of the apparent affinity constants. It is proposed that the flow rate altered the thickness of the unstirred water layers lining the microvilli and, consequently, the substrate concentrations at the contact of the transport sites. Assuming this, these results could further suggest that molecular diffusion through these water layers may be rate-limiting in the overall process of absorption, even for hydrosoluble substrates such as glucose and amino acids.

0851 FOOD IRON ABSORPTION IN MAN: APPLICATIONS OF THE TWO-POOL EXTRINSIC TAG METHOD TO MEASURE HEME AND NONHEME IRON ABSORPTION FROM THE WHOLE DIET. *(E.)* Bjorn-Rasmussen, E.; Hallberg, L.; Isaksson, B.; Arvidsson, B. (Dept. Med. II, Univ. Goteborg, Sweden). *J. Clin. Invest.* 53(1):247-255, 1974.

A new radioisotope method to measure iron absorption from the whole diet was used to test the accuracy of the two-pool extrinsic tag method. The method is based on the concept that food iron is absorbed from 2 pools, the heme iron pool and the nonheme iron pool, which can be expecially labeled with two radioiron isotopes given as hemoglobin and as an iron salt. The meals were composed as averages of 6-week food intake in the present material of 32 young enlisted men. The mean total heme and nonheme iron absorption in the subjects was 1.01 mg. This figure agrees well with the mean daily losses expected for this group of subjects (1.0 mg). Therefore, there are no major systematic errors in the present method to measure the total iron absorption from a mixed diet. Comparison of the absorption of heme and nonheme iron from the meals indicated significant correlation between the absorption of the two kinds of iron. However, a much greater fraction of the heme iron was absorbed (37%) than the nonheme iron (5%). The absorption both from breakfast and lunch was found to give a good prediction of the total daily nonheme iron absorption. There was a significant increase in iron absorption when the level of iron fortification of the meals was increased from 16.4 to 25.5 mg.

0852 STUDIES OF THE GASTRIC MUCOSAL BARRIER - ITS RELEVANCE TO CLINICAL GASTRIC DISEASE. *(E.)* Silen, W. (Beth-Israel Hosp., Boston, Mass.). *Guy's Hosp. Reports* 121(4):247-257, 1972.

0853 STUDIES ON THE MALABSORPTION SYNDROMES. INHIBITION OF $(Na^{+}-K^{+})$ ATPase OF SMALL INTESTINE MICROVILLI BY PYRROLIDONE CARBOXYLIC ACID. *(E.)* Escobedo, M.; Cravioto, J. (Hosp. Infantil, Mexico). *Clin. Chim. Acta* 49(2):147-151, 1973.

0854 THE INFLUENCE OF DIET UPON THE QUANTITY AND TYPES OF AMINO ACIDS ENTERING AND EAVING THE SMALL INTESTINE OF SHEEP. *(E.)* arrison, D. G.; Beever, D. E.; Thomson, D. J.; sbourn, D. F. (Grassland Res. Inst., Hurley, Engand). *J. Agric. Sci.* 81:391-401, 1973.

0855 MOLECULAR WEIGHT OF A D-GLUCOSE AND L-HISTIDINE-BINDING PROTEIN FROM INTESTINAL RUSH BORDERS. *(E.)* Faust, R. G.; Shearin, S. J. Sch. Med., Univ. North Carolina, Chapel Hill). *ature* 248(5443):60-61, 1974.

0856 SITE OF GLUCOSE ABSORPTION FROM THE INTESTINE OF ZAMBIAN AFRICAN SUBJECTS. *E.)* Cook, G. C.; Snook, C. R. (Dept. Med., Univ. ambia, Lusaka). *Am. J. Clin. Nutr.* 27(1):91-95, 974.

857 ALCOHOL AND ABSORPTION OF CALCIUM IN MAN. *(Fr.)* Verdy, M.; Caron, D. (Service ndocrinol. Metabol. Nutrition, Montreal, Canada). *iol. Gastroenterol. (Paris)* (Supp.2):157-160, 1973.

858 EFFECT OF PASSIVE WATER ABSORPTION ON TRANSEPITHELIAL MOVEMENT OF EXTRACELLULAR OLUTES IN RAT INTESTINE. *(E.)* Lifschitz, M. D.; Garcia, J. A.; Earley, L. E. (Univ. Texas Hlth. Center, San Antonio, Texas). *Kidney Int.* 4(6): 362-368, 1973.

0859 EFFECTS OF ANTACIDS ON GASTROINTESTINAL ABSORPTION OF ISONIAZID IN RAT AND MAN. *(E.)* Hurwitz, A.; Schlozman, D. L. (Univ. Kansas Med. Ctr., Kansas City). *A. Rev. Respir. Dis.* 109 (1):41-47, 1974.

0860 KINETICS AND Na-DEPENDENCE OF RIBOFLAVIN ABSORPTION BY INTESTINE IN VIVO. *(E.)* Rivier, D. (Fed. Sta. Dairy Res., Bern, Switzerland). *Experientia* 29(11):1443-1446, 1973.

0861 PHYSIOLOGICAL CHANGES IN HUMAN TRANSJEJUNAL POTENTIAL DIFFERENCE. *(E.)* Wingate, D. L.; Hayward, M. G.; Johnson, C. M.; Marczewski, A. G.; Petty, R. G.; Wilson, E. J. (Dept. Physiol., London Hosp. Med. Coll., England). *Scand. J. Gastroenterol.* 8(6):473-478, 1973.

0862 STUDIES ON THE IN VIVO ABSORPTION OF BUTYRIC ACID IN THE SMALL INTESTINE OF THE CAT. *(E.)* Jodal, M.; Lundgren, O. (Dept. Physiol., Univ. Goteborg, Sweden). *Acta Physiol. Scand.* 89(3):327-333, 1973.

0863 TETRACYCLINE INHIBITS IRON ABSORPTION IN MAN. *(E.)* Heinrich, H. C.; Oppitz, K. H. (Univ. Hosp. Eppendorf, Univ. Hamburg, Germany). *Naturwissenschaften* 60:524-525, 1973.

0864 THE EFFECT OF HUMAN, RAT, AND CANINE GASTRIC JUICE ON FERROUS IRON ABSORPTION FROM THE JEJUNUM. *(E.)* Cocking, J. B.; Duthie, H. L. (Northern Gen. Hosp., Sheffield, England). *Scand. J. Gastroent.* 8(7):585-591, 1973.

0865 STUDIES ON ABSORPTION OF DRUGS. VIII. PHYSICOCHEMICAL FACTORS AFFECTING THE ABSORPTION OF SULFONAMIDES FROM THE RAT SMALL INTESTINE. *(E.)* Morishita, T.; Yamazaki, M.; Yata, N.; Kamada, A. (Fac. Pharm. Sci., Osaka Univ., Japan). *Chem. Pharm. Bull.* 21(10):2309-2322, 1973.

0866 THE METHOD OF INTRALUMINAL PERFUSION OF THE HUMAN SMALL INTESTINE. I. PRINCIPLE AND TECHNIQUE. *(E.)* Modigliani, R.; Rambaud, J. C.; Bernier, J. J. (St. Lazare Hosp., Paris, France). *Digestion* 9(2):176-192, 1973.

0867 ABSORPTION AND SECRETION OF SALT AND WATER BY THE SMALL INTESTINE. *(E.)* Turnberg, L. A. (Hope Hosp., Salford, England). *Digestion* 9(4):357-381, 1973.

0868 EFFECT OF TETRAGASTRIN ON CALCIUM ABSORPTION FROM RAT DUODENAL LOOP IN VIVO. *(E.)* Fujita, T. (Univ. Tokyo Fac. Med., Japan). *Endocrinol. Jap.* 20(4):407-410, 1973.

0869 COMPARISON OF THE PORTAL ABSORPTION OF PROTEIN AND SMALL PEPTIDES IN THE FED AND FASTED RAT. *(E.)* Gallo-Torres, H. E.; Ludorf, J. (Hoffman LaRoche Inc., Nutley, N.J.). *J. Nutr.* 103(12):1745-1755, 1973.

0870 ROLE OF THE ILEUM IN FAT ABSORPTION. *(E.)* Wollaeger, E. E. (Mayo Clin., Rochester, Minn.). *Mayo Clin. Proc.* 48(12):836-843, 1973.

0871 CALCIUM ABSORPTION IN THE GASTROINTESTINAL TRACT. *(Dut.)* Raymakers, J. A.; Duursma, S. A.; Hart, W. (Clin. Intern. Med., Univ. Utrecht, Netherlands). *Ned. Tijdschr. Geneeskd.* 117(2):67-72, 1973.

0872 IRON ABSORPTION BY THE DUODENAL MUCOSA. *(Fr.)* Bedard, Y. C.; Pinkerton, P. H.; Simon, G. T. (Dept. Pathol., Univ. Toronto, Canada). *Nouv. Rev. Fr. Hematol.* 13(6):727-744, 1973.

0873 STUDIES ON THE INTESTINAL ABSORPTION OF SYMPATHOMIMETIC SUBSTANCES IN MAN. *(E.)* Petry, R.; Kolb, K. H. (Res. Clin., C.F. Asche & Co., Hamburg, Germany). *Arzneim. Forsch.* 23(11):1535-1538, 1973.

0874 STUDIES ON ABSORPTION OF DRUGS. VII. ABSORPTION OF ISOMERIC N^{1}-HETEROCYCLIC SULFONAMIDES FROM THE RAT SMALL INTESTINES AND RELATIONS BETWEEN PHYSICOCHEMICAL PROPERTY AND ABSORPTION OF UNIONIZED SULFONAMIDES. *(E.)* Kitao, K.; Kubo, K.; Morishita, T.; Yata, N.; Kamada, A. (Fac. Pharm. Sci., Osaka Univ., Japan). *Chem. Pharm. Bull.* 21(11):2417-2426, 1973.

0875 FACTORS INFLUENCING ABSORPTION AND EXCRETION OF DRUGS. I. EFFECT OF FOOD ON GASTROINTESTINAL ABSORPTION OF AMOBARBITAL IN RATS. *(E.)* Kojima, S. (Fac. Pharm. Sci., Kumamoto Univ., Japan). *Chem. Pharm. Bull.* 21(11):2432-2437, 1973.

0876 INTESTINAL ABSORPTION OF DIPEPTIDES CONTAINING GLYCINE, PHENYLALANINE, PROLINE, β-ALANINE OR HISTIDINE IN THE RAT. *(E.)* Boullin, D. J.; Crampton, R. F.; Heading, C. E.; Pelling, D. (British Ind. Biol. Res. Assoc., Carshalton, England). *Clin. Sci. Mol. Med.* 45(6):849-858, 1973.

0877 INTESTINAL ABSORPTION OF D-GLUCOSE AND D-GALACTOSE IN RATS INFECTED WITH NEMATOSPIROIDES DUBIUS. *(E.)* Scofield, A. M. (Dept. Biol. Sci., Wye Coll., Ashford, England). *Comp. Biochem. Physiol.* 47A(1):219-231, 1974.

0878 DISTINCT COMPONENTS OF NEUTRAL AMINO ACID TRANSPORT IN CHICK SMALL INTESTINE. *(E.)* Miller, D. S.; Burrill, P.; Lerner, J. (Dept. Biochem., Univ. Maine, Orono). *Comp. Biochem. Physiol.* 47A(2):767-777, 1974.

0879 SUGAR ABSORPTION BY FLAT JEJUNAL MUCOSA. *(E.)* Desjeux, J. F.; Sassier, P.; Tichet, J.; Sarrut, S.; Lestradet, H. (Herold Hosp., Paris, France). *Acta Paediatr. Scand.* 62(5):531-537, 1973.

0880 RESPONSE OF THE SMALL INTESTINE TO THE APPLICATION OF A HYPERTONIC SOLUTION. *(E.)* Norris, H. T. (VA Hosp., Seattle, Wash.). *Am. J. Pathol.* 73(3):747-764, 1973.

0881 TRANSPORT BY ISOLATED RABBIT GALLBLADDERS IN PHOSPHATE-BUFFERED SOLUTIONS. *(E.)* Sullivan, B.; Berndt, W. O. (Dartmouth Med. Sch., Hanover, N.H.). *Am. J. Physiol.* 225(4):838-844, 1973.

0882 IRON-BINDING SUBSTANCE ISOLATED FROM PARTICULATE FRACTION OF RAT INTESTINE. *(E.)* Yoshino, Y.; Manis, J. (Hosp. Joint Dis. Med. Ctr., New York, N.Y.). *Am. J. Physiol.* 225(6):1276-1281, 1973.

0883 NEUROGENIC HYPERCHOLESTEROLEMIA. III. CHOLESTEROL SYNTHESIS, ABSORPTION, AND CLEARANCE. *(E.)* Byers, S. O.; Freidman, M. (Mt. Zion Hosp., San Francisco, Calif.). *Am. J. Physiol.* 225(6):1322-1326, 1973.

0884 THE ACTION OF ADRENALINE ON CALCIUM PUMP AND ADENOSINE TRIPHOSPHATASES ACTIVITIES OF INTESTINAL SMOOTH MUSCLE MICROSOMES. *(E.)* Godfraind, T.; Verbeke, N. (Lab. Pharmacodyn. Gen., Univ. Louvain, Belgium). *Arch. Int. Pharmacodyn.* 204(1):187-190, 1973.

0885 THE DEPENDENCE OF CALCIUM INFLUX INTO RAT INTESTINE ON SUGARS AND ALKALI METALS. *(E.)* Patrick, G.; Stirling, C. (Med. Res. Coun., Harwell, England). *Arch. Int. Physiol. Biochim.* 81(3):453-467, 1973.

0886 THE ACTION OF ACTIVELY TRANSPORTED SUGARS ON THE SODIUM, POTASSIUM, AND FLUID TRANSPORT IN THE JEJUNUM AND ILEUM OF THE RAT. *(Ger.)* Dennhardt, R.; Haberich, F. J. (Inst. Physiol., Phillipps Univ., Marburg, Germany). *Pflugers Arch.* 345(3):221-236, 1973.

0887 TRANSPORT OF AMINO-ACIDS AND SUGARS BY THE DOG COLONIC MUCOSA. *(E.)* Robinson, J. W. L.; Luisier, A.; Mirkovitch, V. (Cantonal Univ. Hosp., Lausanne, Switzerland). *Pfluegers Arch.* 345(4):317-326, 1973.

0888 FOOD IRON ABSORPTION IN MAN. III. EFFECT OF IRON SALT, ASCORBIC ACID AND DESFERRIOXAMINE ON THE ISOTOPIC EXCHANGE BETWEEN NATIVE FOOD IRON AND AN EXTRINSIC INORGANIC IRON TRACER. *(E.)* Bjorn-Rasmussen, E. (Dept. Med., Univ. Goteborg, Sweden). *Scand. J. Haematol.* 11(5):391-397, 1973.

See also, 0809, 0819, 0931, 1032, 1120, 1290, 1352, 1355, 1393.

MOTILITY

0889 STUDIES IN GASTROINTESTINAL INTERACTIONS. IV. GASTRIC EMPTYING OF A COMPOSITE MEAL IN MAN. THE INFLUENCE OF GLUCOSE. *(E.)* Johansson, C. (Karolinska Hospital, Stockholm, Sweden). *Scand. J. Gastroenterol.* 8(6):533-539, 1973.

Gastric emptying of a fluid standard test meal made up of milk protein, fat, and lactose was investigated in 7 healthy subjects and the effect of the addition of 10% glucose to the meal was examined. Following the glucose-free meal the emptying of water, protein, and fat into the duodenum was constant after an early, short rapid phase. The pattern of emptying for lactose was exponential. After addition of glucose the emptying of the meal could be divided into two separate phases, an initial phase characterized by a constant transfer of sugar and comparatively small amounts of water, protein, and fat, and a second coinciding in rates and patterns with those of the glucose-free meals. The results suggest that several mechanisms operate to control the gastric emptying rate during the course of emptying a composite meal.

0890 ELECTRICAL DISCHARGE OF SINGLE ENTERIC NEURONS OF GUINEA PIG SMALL INTESTINE. *(E.)* Wood, J. D. (Univ. Kansas Med. Ctr. Kansas City, Mo.). *Am. J. Physiol.* 225(5):1107-1113, 1973.

Microelectrode studies of single-unit activity in the myenteric plexus of the guinea pig jejunum revealed 3 kinds of intrinsic neurons that could be distinguished on the basis of pattern of electrical discharge. Burst-type units spontaneously discharged bursts of spikes at periodic intervals, mechanosensitive neurons were induced by mechanical stimulation to fire at a faster rate, and single-spike units gave single spontaneous action potentials at variable intervals. Spike-interval histograms for burst units were bell shaped with positive values of coefficient of skewness. Coefficient of variation of interspike interval was directly related to mean spike interval. Serial analysis of interspike intervals showed progressive increase in spike interval between the onset and end of each burst. Some burst units displayed periodic conversions from a burst pattern to a pattern of continuous discharge. Multiunit records showed occurrence of interactions between mechanoreceptors and burst-type neurons. Spike-interval histograms of single-spike units were platykurtic with relatively large variance of interspike interval.

0891 DIFFERENCES BETWEEN THE ACTION OF MORPHINE AND CHOLINERGIC AGENTS ON THE ELECTRICAL ACTIVITY OF THE COLON IN UNANESTHETIZED CATS. *(Fr.)* Wienbeck, M.; Christensen, J.; Weisbrodt, N. W. (Med. Clin., Univ. Marburg/Lahn, Germany). *Biol. Gastroenterol. (Paris)* 6(3):243-250, 1973.

Strain gauges and needle electrodes were sutured to the serosa of the colon of 6 cats to study the motor and electrical activity of the colon. Recordings were made on unanesthetized animals for 2-5 months after surgery. The basal electrical activity consisted of slow waves, spike potentials, and oscillations: their frequency was 5-6 cycles/sec, up to 10 cycles/sec, and 30-40 cycles/sec, resp. Sometimes the fast electrical activity took on a cyclical pattern with activity recurring at intervals of about 1 min. Some of the effects of bethanechol chloride (0.2 mg/kg i.m.), methacholine chloride (0.1 mg/kg i.m.), and neostigmine methyl sulfate (0.2 mg/kg) resembled those of morphine (0.1 mg/kg of the base as the chloride or sulfate i.m.). Both cholinergic agents and morphine caused a marked stimulation of fast electrical activity and contractions and decreased the slow-wave frequency. However, the cholinergic agents mainly activated the spike potentials, while morphine produced oscillations which sometimes lasted for several minutes. In addition, the spike bursts which occurred after administration of cholinergic agents were propagated along the colon, while the oscillations following morphine injection occurred independently in one or another segment of the colon and were not accompanied by propulsive activity. It is concluded that electromyography of the colon *in vivo* makes it possible to distinguish between otherwise hidden pharmacological effects and to account for clinical results obtained by treatment with cholinergic agents.

0892 EFFECTS OF UNPROCESSED BRAN OR COLON FUNCTION IN NORMAL SUBJECTS AND IN DIVERTICULAR DISEASE. *(E.)* Findlay, J. M.; Smith, A. N.; Mitchell, W. D.; Anderson, A. J. B.; Eastwood, M. A. (Western Gen. Hosp., Edinburgh, Scotland). *Lancet* (7849):146-149, 1974.

The effects of adding 20 gr of unprocessed bran to a habitual diet were studied in 6 control subjects and 7 patients with uncomplicated diverticular disease of the colon. Polyethylene glycol 4000

(PEG) and chromium sesquioxide (Cr_2O_3) were used to mark the liquid and solid phases of the gastrointestinal content, respectively. Transit-time was reduced significantly in patients with diverticular disease. Stool weight increased by an average of 63 g in normal subjects, but did not increase significantly in patients with diverticular disease (only 17 g). There was no significant change in the freeze-dried weights as a percentage of total weight on bran. In normals, the concentration of Cr_2O_3 remained unchanged, but P.E.G. concentration decreased. In patients with diverticular disease, the concentration of both markers fell by about 30%. It is concluded that the increase in stool weight observed in bran-fed controls was associated with an increase of solid material and associated nonsolvent water, but not an increase in interstitial water. The motility studies in the patients indicate no significant change in basal activity, but the response to food was associated with a fall in motility index of some 30% after 1 month on bran. The response to prostigmine, which produces intense cholinergic stimulation of the colon, fell by 44%. There would thus appear to be a diminution in response to stimuli in patients with diverticular disease who are fed bran.

0893 EFFECTS OF BACTERIAL FLORA ON CECAL SIZE AND TRANSIT RATE OF INTESTINAL CONTENTS IN MICE.

(E.) Iwai, H.; Ishihara, Y.; Yamanaka, J.; Ito, T. (Central Inst. Exp. Animals, Tokyo, Japan). *Jap. J. Exp. Med.* 43(4):297-305, 1973.

Effects of different bacterial flora on the cecal size and transit rate of intestinal contents were examined in germfree, gnotobiotic, and conventional mice. The cecum of conventional infant mice increased in size before the establishment of a decreased level of Enterobacteriaceae, attaining a size similar to that of adult conventional mice. In most ex-germfree mice having a reduced Enterobacteriaceae level after exposure to a conventional environment, the cecal size became as small as that of conventional mice. This occurred also in a few cases having a high level of the organisms. The cecum of gnotobiotic mice associated with *Escherichia coli*, *Streptococci faecales*, Lactobacillus, and Bacteroides was not reduced in size. A larger number of *E. coli* was excreted in feces. In mice associated with the same species of organisms as above plus 12 or 13 strains of strict anaerobes, the cecum was reduced in size to a conventional level excreting a high level of *E. coli* in feces. The transit rate of intestinal contents was extremely low in germfree compared with conventional mice, but in the gnotobiotic mice with normal-sized cecum, the transit rate was as high as in conventional mice. A significant correlation between cecal size and transit rate of intestinal contents was shown, indicating that some physiologic functions in the digestive tract of mice are regulated by the presence of intestinal bacterial flora. It is suggested that the cecum is a site where close relations between some host physiologic functions and microflora can be realized. It is further assumed, since the suppression of increase in cecal size occurs after the establishment of normal intestinal flora, that changes in some physiologic functions in mice and rats during early life are regulated by bacterial flora.

0894 EFFECTS OF TRANSECTION ON SMALL INTESTINAL SLOW-WAVE PROPAGATION VELOCITY.

(E.) Diamant, N. E.; Wong, J.; Chen, L. (Inst. Med. Sci. Univ. Toronto, Canada). *Am. J. Physiol.* 225(6):1497-1500, 1973.

The effect of duodenal transection on in situ slow-wave propagation velocity and frequency along the upper small intestine was studied in 9 mongrel anesthetized dogs. Before transection, the usual frequency plateau was seen in the upper small bowel with a decrease in propagation velocity along its length. Below the transection, propagation velocity was increased at each recording site along the new plateau of lower frequency with a gradient of decreasing velocity maintained along the plateau. When the frequency below the cut was varied, propagation velocity at each location was related inversely to slow-wave frequency. The change in velocity per unit change in slow-wave frequency was greatest proximally and decreased as one proceeded distally. Between animals, differences in duodenal slow-wave propagation velocity also related inversely to frequency differences between animals. The increase in slow-wave propagation velocity may be one cause of rapid transit of intestinal contents following operations (e.g., peptic ulcer surgery) that involve transection of the upper intestine.

0895 EFFECTS OF EXTRINSIC DENERVATION ON THE FLUORESCENCE OF MONOAMINES IN THE SMALL INTESTINE OF THE CAT.

(E.) Ahlman, H.; Enerback, L.; Kewenter, J.; Storm, B. (Dept. Pathol., Univ. Linkoping, Sweden). *Acta Physiol. Scand.* 89(3):429-435, 1973.

The effects of section of the nerves supplying the small intestine on the fluorescence of monoamines in the cat were studied *in vivo* at different times after the operation in 12 cats. Before denervation, biopsies from the jejunum and ileum were studied by a fluorescence method in order to observe the adrenergic innervation and the presence of 5-hydroxytryptamine (5-HT). In addition to the adrenergic fibers terminating around the ganglion cells of the intestinal nervous plexuses, other adrenergic fibers were seen in close connection with the muscle fibers in both muscular layers. The only location of 5-HT seemed to be in the enterochromaffin cells of the mucosa. After nerve section the completeness of the denervation was established in an acute experiment by means of electrical stimulation of the vagal and splanchnic nerves while registering the motility of a jejunal and an ileal loop. Afterwards the small intestinal wall was studied with the same histochemical fluorescence method. No changes were found in the bowel habits or in the general state of nutrition of the animals. The intestinal adrenergic innervation completely disappeared after denervation. The adrenergic innervation does not seen to be necessary for adequate peristaltic activity in the small intestine. 5-HT did not disappear after denervation but was found unchanged in the enterochromaffin cells.

0896 VAGAL RELAXATION OF THE STOMACH INDUCED FROM THE GASTRIC ANTRUM. *(E.)*

Abrahamsson, H. (Dept. Physiol., Univ. Goteborg, Sweden). *Acta Physiol. Scand.* 89(3):406-414, 1973.

The effect of mechanical stimulation of the gastric antrum on gastric (corpus-fundus) motility was studied in 18 anesthetized cats. Antral distension elicited a pronounced corpus-fundus relaxation which was not blocked by 0.5 to 1.0 mg/kg atropine, 3.0 to 4.2 mg/kg guanethidine or by cervical spinal cord transection but was abolished by blockade of the vagal nerves. The "threshold stimulus" for eliciting the reflex response was an antral distension pressure between 5 and 10 cm H_2O. Stepwise increases of antral distension produced correspondingly increased corpus-fundus relaxations. A steady antral distension could keep the corpus-fundus part relaxed for at least 10 min. I.a. infusion of acetylcholine to the antrum produced antral contractions followed by a marked corpus-fundus relaxation which persisted after guanethidine. Electric afferent stimulation of antral nerve branches elicited a gastric relaxation similar to the corpus-fundus response to antral distension. It is concluded that activation of slowly adapting tension receptors, located in the antral gastric wall and with vagal afferents, elicits gastric relaxation by a reflex activation of the vagal non-adrenergic relaxatory fibers to the stomach. These reflex mechanisms are suggested to be involved in the control of gastric reservoir function (receptive relaxation) and gastric emptying.

0897 COLONIC MOTILITY IN THE CAT. V. INFLUENCE OF TELENCEPHALIC STIMULATION AND THE PERIPHERAL PATHWAYS MEDIATING THE EFFECTS. *(E.)*

Rostad, H. (Inst. Neurophysiol., Univ. Oslo, Norway). *Acta Physiol. Scand.* 89(2):169-181, 1973.

The cerebral cortex and intracerebral structures were stimulated in 50 lightly anesthetized cats while colonic motility was recorded using extraluminal strain gage transducers. Excitatory colonic responses were produced from the anterior ectosylvian gyrus (the second somatic sensory-motor area) and from a small zone around the anterior end of the lateral sulcus. These effects were mediated through the vagal nerves. Colonic inhibition resulted from stimulation of 3 separate cortical zones, the anterior sigmoid, the orbital and the anterior cingulate tyri. These effects were mediated mainly through the lumbar colonic nerves. Stimulation of the amygdaloid nuclei produced excitatory colonic effects mediated through the lumbar colonic nerves. Inhibitory effects were not obtained from the mygdala. Weak colonic contractions resulted from timulation of the olfactory bulb and tract and ere conveyed through the parasympathetic vagal and elvic nerves.

0898 PHYSIOLOGIC SPECIALIZATION AT ESOPHAGOGASTRIC JUNCTION IN THREE SPECIES. *(E.)*

Christensen, J.; Conklin, J. L.; Freeman, B. W. (Univ. Hosp., Univ. Iowa, Iowa City). *Am. J. Physiol.* 225(6):1265-1270, 1973.

In 10 opossums, 5 cats, and 5 rhesus monkeys comparisons were made of length-resting tension relationships and responses to low-frequency electrical field stimulation among serial 2 mm-wide strips cut transversely from the esophagogastric junction and adjacent stomach and esophageal body. Three regions are distinguished on the basis of the nature of the response to field stimulation. Strips from the stomach contracted during stimulation; those from the esophageal body contracted briefly after the end of the stimulus; strips from the esophagogastric junction relaxed during stimulation. Transitional areas lay between the 3 regions showing these tetrodotoxin-sensitive responses. The length-resting tension slopes of strips from the esophagogastric junction were steeper than those of strips from the stomach and esophageal body. The strips which relaxed with field stimulation included those with the steepest slopes of the length-resting tension relationship. Slopes of length-resting tension were poorly correlated with muscle mass. In all 3 species, intrinsic specialization occurs at the esophagogastric junction in the nature of the innervation and in the mechanical properties of the inner muscle layer.

0899 EFFECT OF CORPORAL AND ANTRAL GASTROJEJUNOSTOMY ON CANINE GASTRIC EMPTYING OF SOLID SPHERES AND LIQUIDS. *(E.)*

Kelly, K. A.; Morley, K. D.; Wilbur, B. G. (Mayo Clin., Rochester, Minn.). *Br. J. Surg.* 60(11):880-884, 1973.

Gastric emptying of solids and liquids was measured in 12 dogs with and without corporal or antral gastrojejunostomy. Both types of stoma hastened the onset but did not alter the time from onset to complete emptying of 40 small plastic spheres. Corporal gastrojejunostomy slowed the emptying of 400 ml. of 154 mM NaCl but not of 500 mM glucose, whereas antral gastrojejunostomy slowed the emptying of both. In spite of the presence of a stoma with a diameter about 4 times that of the spheres, the net rate of emptying of spheres from the stomach did not differ from that of the controls. Gastric emptying of liquids is slower after gastroenterostomy because of the circular movement of gastric content from the stomach to the duodenum and jejunum and back into the stomach again via the stoma. The slow emptying is a net result of 2 opposing fluxes: the discharge of gastric content through the pylorus and through the stomach, and the reentry of this content into the stomach via the stoma. The experiments indicate that gastro-enterostomy may aid the healing of duodenal ulcers by slowing the net rate of emptying of corrosive gastric juices and allowing small intestinal content to enter the stomach where it can buffer and neutralize hydrogen ions.

0900 EFFECT OF VAGOTOMY ON GALLBLADDER SIZE AND CONTRACTILITY IN THE DOG. *(E.)*

Amberg, J. R.; Jones, R. S.; Moss, A.; Gourlay, S.; Goldberg, H. I. (Vanderbilt Univ. Sch. Med., Nashville, Tenn.). *Invest. Radiol.* 8(6):371-376, 1973.

Planimetry of the radiographic image of the gallbladder was used to study the response of the gallbladder to cholecystokinin (CCK) in dogs. The resting size of the gallbladder in each dog was variable during the 6 observations made. Despite the resting size difference, good dose response curves were obtained using 1/4, 1/2, 1, 2, and 4 units of CCK/kg. The relative reduction of gallbladder size from the resting state was considered the response. After truncal vagotomy, there was an increase in the mean resting size of each gallbladder which ranged from 22% to 87%. Progressive increase in gallbladder size did not occur when measurements at 3 weeks post-vagotomy were compared with those made at 7 months. After truncal vagotomy, the response to CCK was not altered. Endogenous CCK release secondary to exogenous CCK stimulation of gastric acid secretion was also studied and found not to be a significant factor in gallbladder contraction. It was thus felt that the secondary effect of gastric achlorhydria produced by truncal vagotomy did not invalidate the CCK dose response data.

0901 THE RELATIONSHIP BETWEEN INHIBITION OF ACETYLCHOLINESTERASE AND SENSITIVITY OF THE RAT ILEUM TO CARBACHOL. *(E.)*

Foley, D. J.; Stitzel, R. E.; McPhillips, J. J. (West Virginia Univ. Med. Ctr., Morgantown). *Pharmacology* 10(5):298-305, 1973.

Repeated injections of the cholinesterase inhibitor disulfoton to female albino rats cause diminished sensitivity of the ileum to the spasmogenic action of carbachol. A slight degree of diminished sensitivity appeared after the second injection and diminished sensitivity increased as treatment progressed. Measurement of acetylcholinesterase activity of the ileum revealed that inhibition of the enzyme also became greater as treatment progressed. When the injections of disulfoton were discontinued acetylcholinesterase levels returned to normal sometime between 2 and 5 days after the last injection of disulfoton whereas normal sensitivity to carbachol was not restored until sometime between 5 and 8 days. Repeated injections of echothiophate, parathion and OMPA also produced diminished sensitivity to the spasmogenic action of carbachol.

0902 CRYSTALLINE PANCREATIC GLUCAGON--A NEW SPASMOLYTIC AGENT: RESULTS OF COMPARATIVE ENDOSCOPIC AND ELECTROMANOMETRIC INVESTIGATIONS IN THE PROXIMAL GASTROINTESTINAL TRACT. *(E.)*

Paul, F.; Misaki, F.; Seifert, E. (Med. Sch., Hannover, Germany). *Endoscopy* 5(4):199-204, 1973.

Inhibition of peristalsis and reduction of muscle tone is desirable or necessary for the majority of diagnostic and therapeutic endoscopic procedures on the proximal gastrointestinal tract. Spasmolytics with atropine-like activity, or beta-receptor blockers are not free from undesirable side-effects at pharmacological doses. The ability of crystalline pancreatic glucagon as a single i.v. injection or as an i.v. infusion over a 30-min period to suppress motor activity in the stomach and duodenum of 30 patients was demonstrated both endoscopically and manometrically. The inhibitory effect begins within less than 1 minute, and persists for about 15 min. After this the motor activity returns gradually and increasingly. The period of motor quiescence is usually sufficient for careful endoscopic examination or for endoscopic operative procedures. No subjective side-effects were observed at the 0.2 mg dose in any case. Crystalline glucagon, therefore, appears to be the most suitable agent currently available for the reduction of tone and inhibition of peristalsis in the proximal gastrointestinal tract. The field of use of this potent "physiological spasmolytic" certainly extends beyond gastrointestinal endoscopy.

0903 PRESSURE RESPONSES TO CHOLINERGIC AND ADRENERGIC AGENTS IN THE FUNDUS, CORPUS, AND ANTRUM OF ISOLATED RAT AND GUINEA-PIG STOMACHS. *(E.)*

Haffner, J. F. W. (Dept. Pharmacol., Univ. Oslo, Norway). *Acta Chir. Scand.* 139(7):650-655, 1973.

The effects of acetylcholine, carbachol, adrenalin, noradrenalin, phenylephrine and isoprenaline on the pressure in the fundus, corpus and antrum of 7 male albino Wistar rats and 6 male guinea-pig stomachs, were studied *in vitro*, and compared with those previously obtained in rabbit stomachs. As found previously the pressure changes in the antrum were brief and rhythmic (4-7/min) while those in the fundus were slow and of many minutes' duration. The corpus appeared to represent a transitional zone. These motility patterns are characteristic of mammalian stomachs in general. The cholinergic agents caused a sustained pressure-increase in the fundus, and augmented amplitude and rate of contractions in the antrum. Adrenergic β-receptor stimulation with isoprenaline gave a sustained loss of pressure in the corpus and fundus and prolonged reduction of the rhythmic contractions in the antrum. α-Receptor stimulation with phenylephrine also inhibited contractions in the antrum, but the response in the corpus and fundus was biphasic; a brief relaxation preceding a sustained increase in pressure. Contrary to the rabbit preparations this secondary increase rarely exceeded the initial pressure, probably due to relatively high spontaneously developed pressure in rat and guinea-pig stomachs. The effects of adrenalin and noradrenalin were mixtures of α- and β-receptor responses, but generally they were more like the effects of phenylephrine than those of isoprenaline.

0904 IS THE PRIMARY PERISTALTIC CONTRACTION OF THE CANINE ESOPHAGUS BOLUS DEPENDENT? *(E.)*

Janssens, J.; Valembois, P.; Vantrappen, G.; Hellemann, J.; Pelemans, W. (Lab. Gastroenterol.

Physiopathol., Louvain, Belgium). *Gastroenterology* 65(5):750-756, 1973.

The necessity of a bolus for the progression of the primary esophageal peristaltic contraction was examined in 20 mongrel dogs. Esophageal transection with bolus deviation was carried out both at the cervical and at the thoracic level, with the vagal innervation remaining intact. If the swallowed bolus was deviated at the cervical level no peristaltic contraction occurred in the thoracic esophagus, whereas a normal peristaltic progression was possible if the bolus was deviated at the thoracic level. Consequently, a primary peristaltic contraction is entirely bolus-dependent only in its course through the cervical esophagus but not through the thoracic part of the gullet. Two mechanisms seem to be involved in the production of a peristaltic esophageal contraction: the central regulating mechanism in the medulla oblongata, and afferent information originating in the esophagus by the presence of a bolus. The latter is a prerequisite at the cervical level but not at the thoracic level. In the thoracic part of the gullet, however, it greatly facilitates the peristaltic progression of the esophageal contraction.

0905 ELECTRICAL AND CONTRACTILE ACTIVITIES OF THE SMALL INTESTINE OF THE CAT. *(E.)* Weisbrodt, N. W. (Univ. of Texas Med. Sch., Houston). *Am. J. Dig. Dis.* 19(2):93-99, 1974.

Five conscious cats were studied in the fasted and fed states to characterize the electrical and contractile activities of the feline small intestine. Slow waves were present at a frequency which decreased from 18 cycles/min in the duodenum to 13 cycles/min in the terminal ileum. There was a frequency "plateau" over the proximal 40 to 60% of intestine where the slow waves were coupled. Spike potentials of 2 types were present. The majority of spikes occurred only during the depolarization phase of the slow waves and were accompanied by phasic contractions. The second type of spiking (occurring only in fasted animals) was characterized by a 4- to 16-sec prolonged burst of spike potentials that first appeared in the upper small bowel and spread aborally. This burst was accompanied by a large tonic contraction. The slow waves were disrupted by the prolonged burst. These experiments demonstrate that the small intestine of the cat exhibits many of the same electrical and mechanical activities present in both dog and man. The prolonged bursts are not entirely analogous, however, as their periodicity is not as regular as the canine migrating myoelectric complex, and the contraction associated with the prolonged burst consists of a single, fused, tonic contraction which lasts for several seconds rather than a series of large-amplitude, phasic contractions.

0906 MIGRATING SPIKE BURSTS AND ELECTRICAL SLOW WAVES IN THE CAT COLON: EFFECT OF SECTIONING. *(E.)* Christensen, J.; Anuras, S.; Hauser, R. L. (Univ. Hosp., Iowa City). *Gastroenterology* 66(2):240-247, 1974.

The circular muscle electromyogram was recorded with up to 16 electrodes spaced uniformly along the whole cat colon *in vitro* before and after complete division of the colon between the electrodes. Before division, the electromyogram of the proximal colon contained slow waves with superimposed short spike bursts, while the distal three-fourths of the colon exhibited both slow waves and a periodic prolonged migrating spike burst. Seventy percent of migrating spike bursts started about the hepatic flexure of the colon and spread aborad: 30% started distally and spread orad. The period of the bursts was 74.3 to 83.0 sec, their duration 26.6 to 35.8 sec, and their velocity, 5.15 mm/sec aborad and 4.77 mm/sec orad. The migrating spike bursts were abolished by sectioning of the colon. Before partition, slow wave frequency was 4.5 cycles/min in the most proximal 10% of the colon, and 6.0 cycles/min in the most distal 10%, with intermediate values at intermediate points. After partition, slow wave frequency declined to an average of 1.9 cycles/min, 44% of the control value, in the most proximal 10% of the colon, and rose to an average of 7.3 cycles/min, 121% of the control value, in the most distal 10%. The migrating spike bursts and the slow waves appear to be unrelated. It is not possible to be certain of the influence of the polarity of the electromyographic events upon movements of the wall or on the direction of the fecal flow, for experiments correlating fecal flow, wall movements and electromyography have yet to be done. Nevertheless, the polarity of these electrical signals, if they are analogous to the similar signals in the stomach and small bowel may be expected to influence patterns of flow in the colon by affecting patterns of wall movement.

0907 EFFECTS OF A TEST OF PSYCHO-VISCERAL REACTIVITY ON GASTROINTESTINAL MOTILITY. *(Fr.)* Labo, G.; Lanfranchi, G. A.; Barbara, L.; Trombini, G.; Bortolotti, M.; Miglioli, M. (Inst. Med. Path., Univ. Bologna, Italy). *Arch. Fr. Mal. App. Dig.* 62(6):473-480, 1973.

0908 EFFECT OF STAPHYLOCOCCUS TOXIN ON ISOLATED GUINEA PIG ILEUM UNDER TRANSMURAL ELECTRICAL STIMULATION. *(Gr.)* Hennighausen, G.; Wiegershausen, B. (Inst. Pharmacol. Toxicol., Univ. Rostock, Germany). *Naturwissenschaften* 11(5):491-495, 1972.

0909 RATE OF GASTRIC EMPTYING OF PHENOL RED IN A RABBIT. *(E.)* Goto, S.; Yamagata, T.; Tsuzuki, O.; Iguchi, S. (Fac. Pharm. Sci., Okayama Univ., Japan). *Chem. Pharm. Bull.* [*Tokyo*] 21(11):2495-2499, 1973.

0910 EFFECT OF "SUBSTANCE R" ON THE MEMBRANE POTENTIAL OF SMOOTH MUSCLE CELL OF GUINEA-PIG TAENIA COLI. *(E.)* Suzuki, T. S.; Fukushi, Y.; Suzuki, T. (Tohoku Univ. Sch. Med., Sendai, Japan). *Tokushima J. Exp. Med.* 110(4):407-408, 1973.

0911 SOME EFFECTS OF CAERULEIN ON THE MOTILITY OF SHEEP FORESTOMACH AND GALL BLADDER. *(E.)* Faustini, R.; Beretta, C.; Cheli. R.: De Gresti, A. (Inst. Vet. Pharmacol. Toxicol., Univ. Milan, Italy). *Pharmacol. Res. Commun.* 5(4):383-387, 1973.

0912 SENSITIZING ACTION OF METABOLIC INHIBITORS ON RESPONSE OF THE ISOLATED GUINEA PIG ILEUM TO THE ACTION OF ACETYLCHOLINE, HISTAMINE, ANGIOTENSIN, AND BRADYKININ. *(Fr.)* Valette, G.; Leclair, M. F. (No affil.). *C. R. Soc. Biol.* 167(5):668-670, 1973.

0913 STUDY OF THE MOTOR FUNCTION OF THE ESOPHAGUS AND ITS SPHINCTERS. TECHNIQUE AND ANALYSIS OF MANOMETRIC TRACINGS. *(Sp.)* Benages, A.; Ridocci, M. T.; Civera, R. G.; Cosin, J. A.; Molina, R.; Garcia-Conde Gomez, F. J. (no affil.). *Rev. Esp. Enferm. Apar. Dig.* 41(1):1-20, 1973.

0914 STOMACH EMPTYING OF LIQUIDS MEASURED QUANTITATIVELY BY THE USE OF A NONABSORBABLE MARKER IN THE DUODENUM. *(Sp.)* Meeroff, J. C.; Go, V. L. W.; Phillips, S. F. (Mayo Clin., Rochester, Minn.). *Rev. Esp. Enferm. Apar. Dig.* 41(2):131-148, 1973.

See also, 0830, 1079, 1239, 1388.

SECRETION AND METABOLISM

0915 SYSTEMIC IMMUNITY AFTER LOCAL ANTIGENIC STIMULATION OF THE LYMPHOID TISSUE OF THE GASTROINTESTINAL TRACT. *(E.)* Rothberg, R. M.; Kraft, S. C.; Michalek, S. M. (Dept. Pediatr., Univ. Chicago, Ill.). *J. Immunol.* 111(6):1906-1913, 1973.

The distribution of antibody-producing cells (APC) in lymphoid tissues of New Zealand white rats immunized p.o. with bovine serum albumin (BSA, 0.1% in drinking water/day) was compared with that in animals immunized i.v. (50 mg) or s.c. (7 mg) by determining the concentration of direct and indirect plaque-forming cells in the lymphoid tissues. The spleen was the major site of APC in the i.v. immunized animals and APC predominated in the peripheral lymph nodes of the s.c. immunized group. In contrast, a major site of APC in the orally immunized animals was not directly identified. The concentrations of APC in the spleens of the orally immunized animals were similar to those in the s.c. immunized group, and a relative absence of APC was found in the peripheral and mesenteric lymph nodes, appendix, and Peyer's patches from orally immunized animals. Rabbits ingesting the antigen for several weeks were given 50 mg BSA i.v. and the concentrations of APC in the systemic lymphoid tissues were determined 3 days later. Plaque-forming cells were not detectable 3 days after an i.v. injection of BSA given to previously nonimmunized animals, although at this time a marked increase in their concentration was detected in the lymphoid tissues of the i.v. challenged-orally immunized animals. These findings provide additional evidence that the major site of both secretory and circulating antibody production after local antigenic stimulation at gastrointestinal mucosal surfaces is gut-associated lymphoid tissues and that systemic lymphoid tissues acquire the ability to produce anti-BSA.

0916 METABOLISM OF ^{125}I-LABELED SYNTHETIC HUMAN GASTRIN IN THE DOG AFTER PORTAL INJECTION. *(Fr.)* Bali, J. P.; Balmes, J. L.; Sellami, A.; Fournajoux, J.; Cayrol, B.; Khazrai, H. (St. Eloi Hosp., Montpellier, France). *Biol. Gastroenterol. (Paris)* 6(2):119-127, 1973.

After injection of 100 ng of ^{125}I-labeled gastrin into the portal vein, plasma clearance of gastrin, the radioactivity of various organs and secretions (urine, bile, gastric juice), and the immunoreactivity of the gastrin were studied in dogs. The plasma clearance curves were biexponential. The concentration of radioactivity in the peripheral veins may be considered to be that of the peripheral compartment, while the intestinal viscera should be considered to represent the central compartment since exchange there is very rapid. These curves show a rapid tissue distribution with a slower degradation. Equilibrium between the 2 compartments was reached after 12 min. No significant differences were found in organ radioactivities, indicating that gastrin is not preferentially metabolized at any one site. Radioactivity was low in the secretions studied confirming the interpretation of the plasma clearance curves. A study of gastrin degradation, measured by the loss in its ability to become adsorbed to carbon and its loss in immunoreactivity, confirmed that the hormone was degraded in 12 min. Its immunoreactivity decreased 50% when it passed through the hepatic parenchyma. The higher levels of immunoreactivity in peripheral veins than in peripheral arteries can be interpreted as preferential retention of the nonimmunoreactive degradation products of gastrin.

0917 THE INFLUENCE OF GUT MICRO-ORGANISMS ON UTILIZATION OF DIETARY PROTEIN. *(E.)* Salter, D. N. (Natl. Inst. Res. Dairying, Shinfield, England). *Proc. Nutr. Soc.* 32(2):65-71, 1973.

0918 THE INFLUENCE OF GUT MICRO-ORGANISMS ON THE METABOLISM OF DRUGS AND FOOD ADDITIVES. *(E.)* Walker, R. (Dept. Biochem., Univ. Surrey, Guildford, England). *Proc. Nutr. Soc.* 32(2):73-78, 1973.

0919 ISOELECTRIC CHARACTERIZATION OF THE ISO-AMYLASES IN HUMAN SALIVA. *(E.)* Scharpe, S.; Lauwers, A.; Cooreman, W. (Lab. Biochem., State Univ. Ghent, Belgium). *Biochimie* 55(8):1003-1004, 1973.

0920 EFFECT OF NORETHANDROLONE UPON SIALIC ACID CONTENT ON SALIVARY GLANDS IN MICE. *(E.)* Curbelo, H. M.; Gamper, C. H.; Devalle, J. J. (Med. Fac., Univ. Buenos Aires, Argentina). *Acta Physiol. Lat. Am.* 23(4):225-258, 1973.

0921 PROTEIN FRACTIONS FROM MOUSE SALIVARY GLANDS AFFECTING EPITHELIAL CELLS IN ORGAN CULTURE. *(E.)* Banks, B. E. C.; Walter, S. J. (Dept. Physiol., Univ. Coll. London, England). *J. Physiol.* 234(2):241-255, 1973.

0922 SECRETORY FIBRES IN THE TRIGEMINAL PART OF THE LINGUAL NERVE TO THE MANDIBULAR SALIVARY GLAND OF THE RAT. *(E.)* Hellekant, G.; Kasahara, Y. (Dept. Physiol., Vet. Sch., Stockholm, Sweden). *Acta Physiol. Scand.* 89(2):198-207, 1973.

0923 SALIVATORY FIBRES IN THE TRIGEMINAL PART OF THE LINGUAL NERVE TO THE MANDIBULAR SALIVARY GLAND OF THE MONKEY. *(E.)* Hellekant, G.; Kasahara, Y. (Dept. Physiol. Vet. Sch., Stockholm, Sweden). *Acta Physiol. Scand.* 89(2):208-212, 1973.

0924 A HISTOCHEMICAL APPROACH TO LOCALIZE THE ION TRANSPORT IN THE PAROTID GLAND OF ADULT CATTLE. *(Fr.)* Vertroost, M.; Lauwers, H. (Lab. Anat. Animal, Univ. Gand, Belgium). *Ann. Histochim.* 18(3):245-252, 1973.

0925 EVIDENCE FOR POST-TRANSCRIPTIONAL MODIFICATION OF HUMAN SALIVARY AMYLASE (AMY_1) ISOZYMES. *(E.)* Karn, R. C.; Shulkin, J. D.; Merritt, A. D.; Newell, R. C. (Indiana Univ. Med. Ctr., Indianapolis). *Biochem. Genet.* 10(4):341-350, 1973.

0926 ACTIVITIES OF SOME GLYCOLYTIC ENZYMES IN THE MAJOR SALIVARY GLANDS OF SOME LABORATORY ANIMALS. *(E.)* Nicolau, J.; Lansac, M. C.; Rosa, R.; Pedroso, F. I.; Leal, A. (Dept. Biochem., Univ. Sao Paulo, Brazil). *Comp. Biochem. Physiol.* 47A(2):399-402, 1974.

0927 EFFECT OF EGTA ON PROTEIN RELEASE AND CYCLIC AMP ACCUMULATION IN RAT PAROTID GLAND. *(E.)* Harfield, B.; Tenenhouse, A. (Dept. Pharmacol., McGill Univ. Montreal, Canada). *Can. J. Physiol. Pharmacol.* 51(12):997-1001, 1973.

0928 DEVELOPMENT OF THE RAT SALIVARY GLANDS. II. THE IDENTIFICATION OF A TRYPSINLIKE PROTEASE IN THE SUBMAXILLARY GLAND. *(E.)* Barrett, M. L.; Ball, W. D. (Dept. Zool., Univ. Washington, Seattle). *Dev. Biol.* 36(1):195-201, 1974.

0929 LYSOSOMAL ENZYMES IN RELATION TO THE ISOPROTERENOL-INDUCED SECRETORY CYCLE IN RAT PAROTID GLAND. *(E.)* Robinovitch, M. R. (Dept. Oral Biol., Univ. Washington, Seattle). *Exp. Cell Res.* 82(2):439-451, 1973.

0930 ALKALINE PHOSPHATASE AND MYOEPITHELIAL CELLS IN THE PAROTID GLAND OF THE RAT. *(E.)* Garrett, J. R.; Parsons, P. A. (King's Coll. Hosp., London, England). *Histochem. J.* 5(5):463-471, 1973.

0931 KINETICS OF Na TRANSPORT IN THE RAT SUBMAXILLARY MAIN DUCT PERFUSED IN VITRO. *(E.)* Field, M. J.; Young, J. A. (Dept. Physiol., Univ. Sydney, Australia). *Pfluegers Arch.* 345(3):207-220, 1973.

0932 (NA^+--K^+) DEPENDENT ATPase IN MOUSE SUBMAXILLARY GLAND. *(E.)* Avdalovic, N.; Kaic, Z.; Damjanov, I.; Solter, D. (Fac. Med., Univ. Zagreb, Yugoslavia). *Pfluegers Arch.* 345(4):295-309, 1973.

0933 DIRECT MEASUREMENT OF VAGAL RELEASE OF GASTRIN. *(E.)* Becker, H. D.; Reeder, D. D.; Thompson, J. C. (Univ. Texas Med. Br., Galveston). *Surgery* 75(1):101-106, 1974.

See also, 0836.

SECRETION AND METABOLISM

Stomach

0934 A WORKING HYPOTHESIS FOR URECHOLINE EFFECTS ON HISTAMINE STIMULATION OF GASTRIC SECRETION. *(E.)* Hirschowitz, B. I.; Hutchison, G. A. (Dept. Med., Univ. Alabama, Birmingham). *Scand. J. Gastroenterol.* 8(8):569-576, 1973.

Gastric juice volume, H and Cl secreted during dose-response studies in 5 dogs with gastric fistula with histamine alone (2-125 μg/kg/hr, each dose given separately for 4 1/2 hr), with Bethanechol alone (10-80 μg/kg/hr), and with histamine (2-50 μg/kr/hr) given against a constant dose background of Bethanechol (40 μg/kg/hr) are described by kinetics conforming to Michaelis-Menten models. Bethanechol produced potentiation of the histamine dose response (increased Vmax) as well as synergism (multiplying the effect of histamine). For the dose of Bethanechol used here, Vmax for peak H$^+$ output was increased by 32% from 35 to 46.3 mEq/hr, while the effect of histamine was multiplied 3.0 times at all doses. Comparable effects were seen on water and Cl. This model may be used to explain the effects of Bethanechol, vagotomy, and anticholinergics on histamine dose response. The effect on pepsin secretion was only additive and thus different from those effects noted on electrolyte secretion.

0935 ADRENERGIC AND SEROTONINERGIC MECHANISMS IN GASTRIC SECRETION IN RATS. *(E.)* Fjalland, B. (Dept. Pharmacol. Toxicol., H. Lundbeck & Co., Copenhagen-Valby, Denmark). *Acta Pharmacol. Toxicol. (Kbh.)* 33(2):103-112, 1973.

The influence of adrenergic and serotoninergic mechanisms on gastric secretion was investigated using fistula- and pylorus-ligated male Wistar rats. Secretion was increased by the tyrosine hydroxylase inhibitor α-methyltyrosine (80 mg/kg s.c.). This effect was reversed by L-DOPA (200 mg/kg s.c.). 6-Hydroxydopamine (30 mg/kg i.v.) also increased gastric output. The tryptophane hydroxylase inhibitor *p*-chlorophenylalanine (100 mg/kg i.p. for 3 consecutive days) reduced gastric output and abolished the increase in gastric secretion induced by α-methyltyrosine. The antisecretory effect of serotonin (2 mg/kg s.c.) was antagonized by α-methyltyrosine. Pretreatment with 6-hydroxydopamine also diminished the antisecretory effect of serotonin. The possible existence of an inhibiting peripheral adrenergic tonus in the regulation of gastric secretion in rats is indicated. The antisecretory effect of large doses of serotonin may be due to displacement of noradrenaline in catecholamine neurones. The data also suggest the existence of a balance between serotoninergic and adrenergic mechanisms in the regulation of gastric secretion in rats.

0936 SECRETION AND ELECTRICAL ACTIVITY OF A UNILATERAL IN VITRO GASTRIC MUCOSA. *(E.)* Makhlouf, G. M.; Duckworth, G. R. (Med. Coll. Virginia, Richmond). *Gastroenterology* 65(6):907-911, 1973.

An *in vitro* unilateral preparation of gastric mucosa is described in which only the serosal side is bathed with a nutrient solution. The preparation permits direct measurement of secretory flow rate and ionic concentration and a continuous recording of transmucosal potential difference. Analysis of amphibian (leopard frog, *Rana pipiens*) secretion obtained in this manner disclosed striking similarities to the *in vivo* mammalian secretion. Thus, the concentrations of Na$^+$ and H$^+$ varied inversely, while the concentrations of K$^+$ and H$^+$ varied directly. Secretion became hypo-osmotic at intermediate acidities, but tended to osmotic equilibrium at high flow rates. Neither the early [K$^+$] transients nor the late decline in [K$^+$ concentrations] were observed *in vitro*. The transmucosal potential difference, after correction for junction potentials, did not alter with the development of secretion. With recent developments in the study of mammalian gastric secretion *in vitro*, this technique can now be adapted to the direct study of mammalian active and passive secretory mechanisms.

0937 EFFECT OF GASTRIC MUCOSAL ACIDIFICATION ON THE ACTION OF PEPSIGOGUES. *(E.)* Johnson, L. R. (Univ. Texas Med. Sch., Houston). *Am. J. Physiol.* 225(6):1411-1415, 1973.

Pepsin secretion was studied in 3 dogs with vagally denervated pouches of the oxyntic gland area. Experiments lasted 3 hr and consisted of 12 15-min collections of 50 ml of fluid which had been put in the pouch at the start of each period plus any secretions during that 15 min. After 1 hr of collections, either NaCl, histamine, pentagastrin, Bethanechol, or secretin was infused i.v. for the remainder of the experiment. Pepsin dose-response curves for each drug were constructed during irrigation of the pouches with phosphate buffer, pH 7.5 and 100 mN HCl. Irrigation of the pouches with 100 mN HCl resulted in a 3-fold stimulation of pepsin secretion. Pentagastrin (4.0-8.0 μg/kg/hr) produced no pepsin secretion in the presence of buffer and caused no increase over that stimulated by topical acid alone. Histamine (0.01-0.08 mg/kg/hr), Bethanechol (0.005-0.04 mg/kg/hr), and secretin (1.0-4.0 U/kg/hr) stimulated pepsin secretion in the presence of buffer, and acid significantly shifted these dose-response curves to the left. Acidification of the pouch significantly increased the maximal response to secretin and histamine, but not Bethanechol. Secretin was much more dependent on the presence of acid than was histamine or Bethanechol. The presence of acid in the stomach contributes significantly to the pepsigogic effects of Bethanechol, histamine, and secretin; pentagastrin does not stimulate pepsin secretion.

0938 NORMAL H$^+$ RATES IN FROG STOMACH IN ABSENCE OF EXOGENOUS CO_2 AND A NOTE ON pH STAT METHOD. *(E.)* Sanders, S. S.; Hayne, V. B.; Rehm, W. S. (Med. Ctr. Univ. Alabama, Birmingham). *Am. J. Physiol.* 225(6):1311-1321, 1973.

0939 PHYSIOLOGY AND PATHOPHYSIOLOGY OF THE ANTRAL HORMONE GASTRIN. *(Ger.)* Hausamen, T. U.; Fritsch, W. P. (1st Med. Clin., Univ. Dusseldorf, Germany). *Klin. Wochenschr.* 51 (19):937-950, 1973.

0940 STUDIES ON THE INFLUENCE OF ACTH AND CORTISONE ON CARBOHYDRATE-PROTEIN COMPLEXES IN THE GASTRIC MUCOSA OF WHITE RATS. *(E.)* Kozlowska, K. (Med. Acad., Gdansk, Poland). *Folia Morphol.* 31(4):535-538, 1972.

0941 GASTRINS IN SERUM. A REVIEW OF GASTRIC RADIOIMMUNOANALYSIS AND THE DISCOVERY OF GASTRIN HETEROGENEITY IN SERUM. *(E.)* Rehfeld, J. F. (Bispebjerg Hosp., Copenhagen, Denmark). *Scand. J. Gastroent.* 8(7):577-583, 1973.

0942 ANTAGONISM OF HISTAMINE H_2-RECEPTORS AND GASTRIC SECRETION. *(E.)* Konturek, S. J. (Med. Acad. Krakow, Poland). *Scand. J. Gastroent.* 8(8):687-689, 1973.

0943 HAEMOGLOBIN-COATED CHARCOAL FOR ESTIMATION OF GASTRIC INTRINSIC FACTOR. *(E.)* Vatn, M. H. (Ulleval Univ. Hosp., Oslo, Norway). *Scand. J. Gastroent.* 8(8):755-760, 1973.

0944 PROTEOLYTIC ENZYME ACTIVITY IN THE GUT OF DOE-SUCKLED AND HAND-REARED RABBITS. *(E.)* Henschel, M. J. (Natl. Inst. Res. Dairying, Shinfield, England). *Br. J. Nutr.* 30(2):351-359, 1973.

0945 STUDIES ON THE MODE OF ACTION OF HISTAMINE H_1- AND H_2-RECEPTOR ANTAGONISTS ON GASTRIC HISTAMINE METHYLTRANSFERASE. *(E.)* Barth, H.; Niemeyer, I.; Lorenz, W. (Clin. Surg., Univ. Marburg/Lahn, Germany). *Agents Actions* 3(3):138-147, 1973.

0946 AUGMENTATION OF PENTAGASTRIN STIMULATED GASTRIC SECRETION IN THE HEIDENHAIN POUCH DOG BY AMODIAQUINE: INHIBITION OF HISTAMINE METHYLTRANSFERASE IN VIVO? *(E.)* Troidl, H.; Lorenz, W.; Barth, H.; Rohde, H.; Feifel, G.; Schmal, A.; Goecke, K.; Reimann-Huhnd, A.; Seidel, W. (Clin. Surg., Univ. Marburg, Germany). *Agents Actions* 3(3):157-167, 1973.

0947 REGULATION OF RAT STOMACH HISTIDINE DECARBOXYLASE ACTIVITY BY THE SERUM GASTRIN CONCENTRATION. *(E.)* Hakanson, R.; Liedberg, G.; Oscarson, J.; Rehfeld, J. F.; Stadil, F. (Dept. Pharmacol., Univ. Lund, Sweden). *Agents Actions* 3(3):178-179, 1973.

0948 DEVELOPMENT OF INTRINSIC FACTOR ACTIVITY IN THE STOMACH OF NEONATAL RABBITS. *(E.)* Deren, J. J. (Univ. Pennsylvania Med. Sch., Philadelphia). *Am. J. Physiol.* 225(6):1351-1354, 1973.

0949 EFFECT OF L- AND DL-HISTIDINE ON PSEUDOCHOLINESTERASE ACTIVITY IN MAST CELLS IN THE RAT STOMACH. *(Fr.)* Delbarre, G.; Delbarre, B.; Jobard, P. (Fac. Med., Tours, France). *Ann. Histochim.* 18(3):201-206, 1973.

0950 STIMULATION OF THE ACID OUTPUT WITH PENTAGASTRIN IN THE STOMACH PERFUSION TEST ON HEALTHY RATS. *(Ger.)* Hantschmann, N. (Dept. Surg., Univ. Clin. Kiel, Germany). *Arzneim. Forsch.* 24(1):79-83, 1974.

0951 CHANGES IN EPITHELIAL CELL PROLIFERATION IN THE GASTRIC MUCOSA OF MICE WITH EXPERIMENTAL GASTRIC EROSIONS AND ULCERS. *(Rus.)* Avetisian, A. A. (Inst. Med. Genetics, Moscow, USSR). *Biull. Eksp. Biol. Med.* 76(12):75-78, 1973.

0952 ACCUMULATION OF BROMINE IONS IN THE STOMACH MUCOSA AFTER PROLONGED ADMINISTRATION OF BROMIDES INTO THE ORGANISM. *(Rus.)* Epshtein, Y. A. (Pavlov Inst. Physiol., Acad. Sci., Leningrad, USSR). *Fiziol. Zh. SSSR* 59(10):1562-1566, 1973.

0953 ON THE ROLE OF SUCCINATE IN ENERGY SUPPLY OF THE HYDROCHLORIC ACID SECRETION IN THE GASTRIC MUCOSA. *(Rus.)* Pokrovsky, A. A.; Gapparov, M. M.; Levin, L. G. (Inst. Nutr. Acad. Med. Sci., Moscow, USSR). *Fiziol. Zh. SSSR* 59(10):1567-1573, 1973.

0954 FAILURE OF LITHIUM TO PROVIDE A MARKER FOR GASTRIC HYDROGEN ION BACK-DIFFUSION IN MAN. *(E.)* Ivey, K. J.; Parsons, C.; Gray, C. (Roy. Prince Alfred Hosp., Sydney, Australia). *Gastroenterology* 66(1):69-72, 1974.

0955 AMYLOPECTIN SULPHATE (SN-263) COATS THE GASTRIC MUCOSAL SURFACE. *(E.)* Zimmon, D. S.; Mazzola, V. (VA Hosp., New York, N.Y.). *Gut* 14(11):847-849, 1973.

0956 RADIOIMMUNOLOGICALLY MEASURABLE GASTRIN LEVEL AFTER "SHAM EATING" IN MAN. *(E.)* Von Berger, L.; Raptis, S.; Stuber, G.; Schmidt, T.; Pfeiffer, E. F. (Dept. Intern. Med., Univ. Ulm, Germany). *Horm. Metab. Res.* 5(5):386, 1973.

0957 CAFFEINE-INDUCED GASTRIC SECRETION IN RATS. *(E.)* Kowalewski, K. (Dept. Surg., Univ. Alberta, Edmonton, Canada). *Proc. Soc. Exp. Biol. Med.* 144(3):1013-1016, 1973.

0958 THE EFFECT OF IRRADIATION UPON GASTRIC SECRETION OF ADRENALECTOMIZED RATS. *(E.)* Groza, P.; Gheorghe, N.; Stefan, M.; Boerescu, J. (Acad. Med. Sci., Bucharest, Rumania). *Rev. Roum. Physiol.* 10(6):435-440, 1973.

See also, 0864, 0998, 1078, 1112, 1115, 1186, 1236, 1301, 1417, 1425.

0959 EFFECT OF CERULEIN ON EXOCRINE PANCREATIC SECRETION IN THE RAT: KINETICS AND DOSE-RESPONSE RELATIONSHIP. *(Fr.)* Debray, C.; Vaille, C.; de La Tour, J.; Roze, C.; Souchard, M.; Chariot, J.; Fox, A. (Bichat Hosp., Paris, France). *Biol. Gastroenterol. (Paris)* 6(2):97-104, 1973.

Pancreatic secretion was studied in fasting anesthetized rats in response to a single rapid injection of cerulein (12-3,000 ng/kg i.v.) administered during continuous infusion of secretin (6 U/kg/hr i.v.). The output of pancreatic juice, total protein concentration and output, and amylase activity and output were measured. Maximal protein concentrations in the pancreatic juice were reached with cerulein doses of 330 ng/kg or higher, and maximal amylase activities were reached with doses of 110 ng/kg or higher. At larger doses the amylase activity remained constant but its output decreased due to inhibition of water secretion. Water secretion was stimulated only slightly by 110 and 330 ng/kg of cerulein and decreased with larger doses. This resulted in a complex log dose/response curve.

0960 PANCREAS ACINAR CELL DIFFERENTIATION: VIII. EFFECT OF METHIONINE ON DNA SYNTHESIS OF PANCREAS ANLAGE IN ORGAN CULTURE. *(E.)* Parsa, I.; Marsh, W. H.; Fitzgerald, P. J. (Downstate Med. Ctr., Brooklyn, N.Y.). *Exp. Cell Res.* 82(2):466-468, 1973.

Rat pancreas embryonic rudiments incubated in a control medium containing 80 mg/liter methionine grew and differentiated during 9 days of organ culture to adult acinar cells characterized by zymogen granules and relatively high levels of enzyme activity. Incubation of the anlagen in a medium with a lower methionine concentration (30 mg/liter) gave growth to a comparable size but no acinar cell formation, no zymogen granules, and no increases of enzyme activity. Anlagen incubated in the medium showed a marked decrease of the autoradiographic labeling index of acinar cell nuclei after exposure to ^{3}H-thymidine during the period of organ culture, whereas culture of anlagen in the medium with a lower methionine concentration led to far less decrease of the acinar cell labeling index. When anlagen which had been grown in the lower methionine concentration medium for 9 days were incubated for 3 additional days in the control medium there was a highly significant drop in the previously high labeling index. The higher level of methionine in the control medium may have been involved in the synthesis of, or the methylation of, an inhibitor of DNA synthesis.

0961 EFFECT OF BETHANECHOL CHLORIDE ON PROTEIN SYNTHESIS IN RAT PANCREAS. *(E.)* Webster, P. D.; Black, O.; Morisset, J. A. (VA Hosp., Augusta, Ga.). *Am. J. Dig. Dis.* 19(2):167-173, 1974.

The effect of bethanechol chloride on protein synthesis was studied in the pancreas of male albino Sprague-Dawley rats. Rats were given either saline or bethanechol chloride in doses of 0.1, 1.0, 2.0, 4.0, and 12.0 mg/kg body wt and killed after 10, 20, 40, 60, 90, 120, and 180 min, resp. Pancreatic protein synthesis was measured by determining *in vitro* incorporation of L-phenylalanine-^{14}C into whole tissue and microsomal protein fractions as well as purified amylase. Effects of bethanechol chloride on secretion were estimated by examining residual amylase content. Doses of 1.0 mg/kg resulted in 23% increases in incorporation of label into tissue proteins and 39% increases in incorporation into microsomal proteins at 20 min. A dose of 2.0 mg/kg resulted in 18 and 31% increases in incorporation into tissue proteins at 40 and 60 min as well as 34 and 14% increases in incorporation into microsomal proteins at 60 and 90 min. Doses of 4.0 mg/kg decreased incorporation into tissue proteins; that is, -36, -19, and -15% at 20, 40, and 60 min and -36, -22, and -14% decreases into microsomal proteins. A dose of 12 mg/kg was associated with -36, -38, and -28% decreases in incorporation into microsomal proteins at 60, 120, and 180 min. These studies show that small doses of bethanechol chloride were associated with induction of pancreatic protein synthesis and secretion. Large doses, on the other hand, were associated with decreased amino acid incorporation. These studies point out the importance of careful attention to dose and time of study.

0962 CHYMOTRYPSINOGEN IN THE INTESTINE OF RATS FED SOYBEAN TRYPSIN INHIBITOR AND ITS INABILITY TO SUPPRESS PANCREATIC ENZYME SECRETIONS. *(E.)* Lyman, R. L.; Olds, B. A.; Green, G. M. (Dept. Nutr. Sci., Univ. California, Berkeley). *J. Nutr.* 104(1):105-110, 1974.

The effect of soybean trypsin inhibitor (SBTI) on changes in the intestinal activities of pancreatic enzymes was studied to provide an explanation for the pancreatic enzyme response evoked when SBTI is fed to rats. Sprague-Dawley rats were intubated with either a control diet or diet containing SBTI. One hr after feeding, intestinal contents were removed and washed with either saline or saline containing chicken ovomucoid. Trypsin and amylase activities were determined and chymotrypsin activity was measured before and after incubation with trypsin. In control rats, intestinal chymotrypsin activity was not increased by incubation with trypsin. In animals fed SBTI, however, trypsin incubation increased intestinal chymotrypsin activity to 3 to 5 times the preincubation levels. Intestinal trypsin activity of rats fed SBTI was reduced to less than 10% of control values. Continuous infusion of purified bovine chymotrypsin or chymotrypsinogen into rats with a bile-pancreatic juice fistula demonstrated that while chymotrypsin suppressed pancreatic enzyme output, chymotrypsinogen did not. It was concluded, therefore, that SBTI acts to stimulate pancreatic secretion by binding intestinal trypsin so tightly it cannot fully activate chymotrypsinogen. Since chymotrypsinogen cannot suppress pancreatic secretion, SBTI effectively removes both enzymes from the intestine. An increased pancreatic enzyme secretion is initiated because of loss of the negative feedback regulation normally exerted by the active enzymes.

0963 EFFECT OF ACTINOMYCIN D, PANCREOZYMIN AND SECRETIN ON RNA SYNTHESIS AND PROTEIN SYNTHESIS AND PROTEIN SYNTHESIS MEASURED IN VIVO IN RAT PANCREAS. *(E.)* Reggio, H.; Cailla, H. L. (Ctr. Biochem. Mol. Biol., Marseille, France). *Biochim. Biophys. Acta* 338(1):37-42, 1974.

The effect of actinomycin D, pancreozymin and secretin on RNA synthesis and protein synthesis was measured *in vivo* in the pancreas of Wistar male rats. The maximum inhibition of RNA synthesis in the pancreas is obtained when the rats are treated with 2 mg/kg actinomycin. In the absence of any other drug, actinomycin inhibits (^{3}H)adenine incorporation into salt-insoluble RNA by 96.3%. When actinomycin is injected into pentobarbital-treated rats or into rats treated with pentobarbital and infused with secretin and pancreozymin, similar inhibition of RNA synthesis is observed. Treatment with pentobarbital alone induces a 70% decrease in (^{3}H)adenine incorporation. A similar decrease is observed even if rats are infused with pancreozymin and secretin in addition to pentobarbital. When (^{3}H)adenine is replaced by (^{32}P)orthophosphate as tracer, similar results are obtained with both pancreas and liver. (9) L-(^{14}C)valine incorporation into protein is lowered by about 50% when rats are treated for 4 hr with actinomycin. When rats are injected with pentobarbital alone, valine incorporation is reduced by 80%. Pancreozymin enhances protein synthesis and its effect is not modified by actinomycin. The level of amylase is lowered in the presence of hormones; the level is lowered to a lesser extent in the presence of actinomycin. Specific activity of free intrapancreatic valine was not modified either by actinomycin or by hormone treatment.

0964 EFFECT OF VARIOUS PROSTAGLANDINS AND SEROTONIN ON PROTEIN SECRETION FROM RAT EXOCRINE PANCREAS. *(E.)* Heisler, S. (Univ. Hosp. Ctr., Sherbrooke, Canada). *Experientia* 29(10):1234-1235, 1973.

To test whether prostaglandins E_2 and $F_{2\alpha}$ in any way regulate secretory events in female Wistar rat exocrine pancreas, their direct actions on basal and stimulated release of secretory protein were monitored *in vitro*. Prostaglandins E_2 and $F_{2\alpha}$ (10^{-8} to 10^{-5}M) did not alter the rate of basal secretion. At 10^{-5}M they did not affect the secretory response to either carbachol (10^{-5}) or dibutyryl cyclic AMP (10^{-3}). Similar results were noted for serotonin (10^{-7} to 10^{4}M). Therefore, it was concluded that, despite the effects on the vasoactive substances on fluid and electrolyte secretion from exocrine pancreas or salivary gland, these substances are without direct effect on the basal or stimulated release of protein from the pancreas.

0965 STIMULATION OF INTESTINAL SECRETION BY POLYPEPTIDE HORMONES. *(E.)* Barbezat, G. O. (VA Wadsworth Hosp., Los Angeles, Calif.). *Scand. J. Gastroenterol.* 8(22):1-21, 1973.

Electrolyte solutions containing phenol red as a non-absorbable marker were perfused through 30 cm Thiry-Vella loops of jejunum or ileum in dogs, and net movements of water and electrolytes were measured. Glucagon (30 g/kg-hr i.v.) caused net secretion of water and salt into the jejunum, while glucagon and pentagastrin reduced net water and salt absorption in both jejunum and ileum. Pure synthetic secretin did not alter net water and salt movements. In the second part of the study intestinal juice was collected from dogs by continuously pumping humidified air at 15 ml/min into the proximal end of the Thiry-Vella loop and collecting secretions from the distal end. The volume and electrolyte composition of the secretions were measured before, during and after stimulation with various polypeptides. Glucagon, pentagastrin, vasoactive intestinal polypeptide and gastric inhibitory polypeptide were all stimulants of gut mucosal secretion. Pure synthetic secretin and the octapeptide of cholecystokinin did not stimulate secretion. The responses to glucagon and pentagastrin in both jejunum and ileum were dose related, while the response to gastric inhibitory polypeptide was only dose related in the jejunum. Stimulation produced an increase in volume of fluid and output of electrolytes, whereas electrolyte concentration remained relatively constant. The composition of the secreted fluid was typical of the level of gut stimulated (high chloride-low bicarbonate in the jejunum, and low chloride-high bicarbonate in the ileum). The protein concentration of the juice dropped during the period of hormonal stimulation suggesting that the fluid was not a transudate. In dogs with 30 cm colonic Thiry-Vella loops, glucagon stimulated secretion, pure synthetic secretin and pentagastrin were ineffective. Colonic juice electrolyte concentration was affected little by stimulation. Neither glucagon nor pentagastrin alone induced diarrhea when infused in intact dogs in large doses for 8 hr. However, when given together, these hormones induced watery diarrhea in all dogs. This effect was not specific to this combination of hormones; simultaneous infusion of the octapeptide of cholecystokinin and pentagastrin also regularly induced diarrhea. It is postulated that these hormones may help regulate intestinal secretion in health, and in diseases characterized by excessive secretion into the bowel.

0966 PANCREATIC ACINAR CELLS: ACETYLCHOLINE-INDUCED MEMBRANE DEPOLARIZATION, CALCIUM EFFLUX AND AMYLASE RELEASE. *(E.)* Matthews, E. K.; Petersen, O. H.; Williams, J. A. (Dept. Pharmacol., Univ. Cambridge, England). *J. Physiol.* 234(3):689-701, 1973.

The effects of acetylcholine on the output of amylase, Ca^{2+} efflux and membrane potential of pancreatic acinar cells were measured in segments of mouse pancreas superfused *in vitro*. Amylase output was measured continuously using an on-line automated fluorimetric method. Ca^{2+} efflux was monitored by the release of $^{45}Ca^{2+}$ from pre-labelled tissue. Intracellular recordings of acinar transmembrane potentials were obtained with glass micro-electrodes.

In some experiments membrane potentials, and in others $^{45}Ca^{2+}$ efflux, were measured concomitantly with amylase release. Acetylcholine depolarized the acinar cells, increased tissue $^{45}Ca^{2+}$ efflux and raised amylase output, each with a similar dose-dependence, i.e. a maximal response at 10^{-5} M, threshold $< 10^{-8}$ M, and ED_{50} values of 0.7 X 10^{-7} M, 0.5 X 10^{-7} M, and 2 X 10^{-7} M for depolarization, amylase release, and $^{45}Ca^{2+}$ efflux, resp. In response to acetylcholine both depolarization and $^{45}Ca^{2+}$ efflux preceded or coincided with the increase in amylase output. Acetylcholine 10^{-5} M and $[K]_0$ 47 mM did not effect $^{45}Ca^{2+}$ efflux in the presence of atropine (3 X 10^{-6} M) but pancreozymin (0.3 u/ml) still elicited a marked increase in $^{45}Ca^{2+}$ release. These results suggest that the stimulatory action of acetylcholine on the pancreatic acinar cell involves, sequentially, a specific receptor-activated increase in membrane permeability, depolarization, Ca^{2+} mobilization and amylase release.

0967 PANCREATIC ENZYME RESPONSE TO SECRETIN AND CHOLECYSTOKININ-PANCREOZYMIN IN THE RAT.

(E.) Folsch, U. R.; Wormsley, K. G. (Maryfield Hosp., Dundee, Ireland). *J. Physiol.* 234(1):79-94, 1973.

A new technique has been devised for collecting pancreatic juice in anesthetized rats. The technique involves perfusion of the duodenum and is particularly suitable for analyzing characteristics of pancreatic enzyme secretion. To ensure stable secretory conditions, male Wistar rats were kept at 30 C. Different combinations of secretin and cholecystokinin-pancreozymin were given by continuous i.v. infusion. Maximal secretion of the pancreatic enzymes was observed with 60 Ivy units/kg-hr cholecystokinin-pancreozymin (amylase) or 120 Clinical units/kg-hr (trypsin) combined with 0.5 Clinical units/kg-hr (secretin). Pancreatic enzyme secretion in response to submaximal stimulation with cholecystokinin-pancreozymin caused significantly less secretion of pancreatic enzymes than in response to maximal stimulation. Pancreatic secretion of enzymes was poorly sustained during constant-rate stimulation with i.v. hormones at all dose rates. These results indicate that enzyme secretion was inhibited either because the stimulus became relatively ineffective or because there was interference with the processes involved in the synthesis or secretion of the enzymes. It is not certain whether the decreased enzyme secretion indicates a direct effect of the small intestinal stimulant hormones, their breakdown products or contaminants, and represents a form of tracyphylaxis due to inactivation of receptor sites, or is due to secondary hormonal or metabolic effects. The biphasic enzyme secretion dose-response patterns appear to be a property of the pancreatic enzyme-secreting cells themselves.

0968 EFFECT OF DIVERSION AND REPLACEMENT OF BILE ON PANCREATIC SECRETION.

(E.) Konturek, S. J.; Thor, P. (Med. Acad., Cracow, Poland). *Am. J. Dig. Dis.* 18(11):971-977, 1973.

Pancreatic bicarbonate and protein outputs were studied under basal conditions and in response to a variety of endogenous and exogenous stimuli in conscious dogs with biliary and pancreatic fistulas and with bile diverted and then replaced into the intestine. Infusion of bile into the duodenum and jejunum but not the ileum caused a marked increase in pancreatic protein secretion, and to a lesser degree in bicarbonate output, only in tests performed under basal conditions. Pancreatic dose-response curves to i.v. secretin and caerulein, to i.d. hydrochloric acid and amino acids, or to feeding liver meal were not significantly altered by the diversion and subsequent replacement of bile into the duodenum. It is suggested that the release of cholecystokinin or neuro-reflex stimulation of pancreas by the bile in the intestine may explain the bile stimulation of pancreatic secretion observed. These studies show that the actual increase of pancreatic secretion evoked by the instillation of bile into the duodenum or jejunum is most pronounced under basal conditions and concerns mainly protein outputs. The physiologic significance of bile stimulus to pancreatic secretion in the fasting state is not clear. It is noted, however, that, due to intermittent gallbladder contraction during interdigestive periods, small amounts of bile are released into the duodenum. Consequently, pancreatic secretory activity proceeds at a low rate even in the absence of food digestion.

0969 EFFECT OF TOLBUTAMIDE ON GLUCAGON SECRETION. II. STUDY IN ISOLATED AND PERFUSED RAT PANCREAS.

(Fr.) Loubatieres, A. L.; Alric, R.; Louratieres-Mariani, M. M.; Puech, R. (no affil.). *C. R. Soc. Biol. (Paris)* 166(12):1761-1764, 1972.

Isolated pancreas from Wistar rats fed *ad libitum* was perfused for 45 min with an isotonic solution containing 1.5 g/liter glucose. In one group of experiments the glucose concentration was then reduced to 0 g/liter, while in a second it was reduced to 1 g/liter. Addition of 0.4 mM tolbutamide in the absence of glucose significantly increased glucagon secretion of the pancreas for 3 min at most. A second increase occurred 30 min after addition of tolbutamide; this increase persisted even after there was no more tolbutamide in the perfusing solution. When glucose was present in the perfusing fluid in a concentration of 1 g/liter, a progressive increase in glucagon secretion occurred over the next 30 min; this increase also persisted after there was no more tolbutamide in the perfusing fluid. The presence or absence of glucose in the perfusing fluid is one of the factors which modify the extent to which cells in the islets of Langerhans react to tolbutamide. Therefore, it is absolutely essential to specify the glucose concentration when studying the effect of tolbutamide on glucagon secretion.

0970 COMPARISON OF SYNTHETIC AND NATURAL PORCINE SECRETINS ON HUMAN PANCREATIC SECRETION.

(E.) Farooq, O.; Sturdevant, R. A. L.; Isenberg, J. I. (Wadsworth VA Hosp., Los Angeles, Calif.). *Gastroenterology* 66(2):204-209, 1974.

The effect of graded intravenous doses of synthetic porcine secretin and natural porcine secretin on pancreatic secretion was examined in 6 healthy male subjects. Pancreatic secretion was also studied in 3 subjects after subcutaneous synthetic secretin. The doses of synthetic secretin were: 0.024, 0.047, 0.094, 0.188, 0.375, 0.75, and 1.5 μg/kg-hr. The doses of natural secretin were: 0.094, 0.188, 0.375, 0.75, 1.5, 3.0, and 6 U/kg-hr. Each dose was infused for 30 min. Calculated maximal response of bicarbonate output and secretin dose for one-half maximal response (D_{50}) were calculated for both synthetic and natural secretins from the means of the dose-response data. The dose-response curves with synthetic secretin and natural secretin were superimposable for: volume, bicarbonate concentration, and bicarbonate and protein output. The observed and calculated maximal responses for bicarbonate secretion were not significantly different between the 2 secretins. Subcutaneous synthetic secretin increased pancreatic secretion above basal for 3 hr. It was concluded that in man: (1) synthetic secretin and natural porcine secretin were of equal efficacy for bicarbonate secretion; (2) 1 μg of synthetic secretin was equivalent to approximately 3.86 U of natural secretin; (3) subcutaneous synthetic secretin was an effective stimulant of pancreatic bicarbonate secretion; (4) synthetic secretin was free of any observed side effects.

0971 EFFECTS OF ACETYLCHOLINE AND PAPAVERINE ON THE SECRETION AND BLOOD FLOW FROM THE PANCREAS OF THE CAT. *(E.)* Lenninger, S. (Dept. Physiol., Univ. Lund, Sweden). *Acta Physiol. Scand.* 89(2):260-268, 1973.

0972 INHIBITION OF HUMAN CHYMOTRYPSIN BY DRIED EGG WHITE. *(E.)* Imondi, A. R.; Ferguson, . L.; Wolgemuth, R. L. (Warren-Teed Pharmaceuticals, Inc., Columbus, Ohio). *Am. J. Dig. Dis.* 18(12):1051-1054, 1973.

0973 THE EFFECT OF SODIUM OLEATE ON CHOLESTEROL SOLUBILITY IN BILE SALT-LECITHIN MODEL SYSTEMS. *(E.)* Inoue, T.; Juniper, Jr., K. (Southern Illinois Univ. Sch. Med., Springfield). *Am. J. Dig. Dis.* 18(12):1067-1074, 1973.

974 CYTOLOGICAL ANALYSIS OF PANCREATIC REGENERATION. *(Ger.)* Gerlowin, E. (Leningrad ed. Inst. Sanit. Hyg., USSR). *Anat. Anz.* 134(5): 97-503, 1973.

975 ADENYLATE CYCLASE ACTIVITY AND THE CONTENT OF INTRACELLULAR CYCLIC AMP IN THE EXOCRINE ANCREAS OF THE RAT. *(Fr.)* Deschodt-Lanckman, M.; obberecht, P.; Christophe, J. (Fac. Med., Univ. russels, Belgium). *Arch. Int. Physiol. Biochim.* 1(3):586, 1973.

976 PHOSPHODIESTERASES WHICH HYDROLYZE CYCLIC NUCLEOTIDES IN RAT PANCREAS. *(Fr.)* obberecht, P.; Deschodt-Lanckman, M.; De Neef, P.; Christophe, J. (Fac. Med., Univ. Brussels, Belgium). *Arch. Int. Physiol. Biochim.* 81(3):593, 1973.

0977 ROLE OF VASOMOTOR ACTIVITY IN THE REGULATION OF EXOCRINE PANCREATIC SECRETION. *(Fr.)* Pascal, J. P.; Vaysse, N. (Purpan Hosp., Toulouse, France). *Biol. Gastroenterol. (Paris)* 6(2):93-96, 1973.

0978 THE DETERMINATION OF LIPASE ACTIVITY IN HUMAN DUODENAL JUICE. *(E.)* Honegger, J.; Hadorn, B. (Univ. Pediatr. Clin., Berne, Switzerland). *Biol. Gastroenterol. (Paris)* 6(3):217-223, 1973.

0979 THE INTERRELATIONSHIPS OF PANCREATIC ENZYMES IN HEALTH AND DISEASES UNDER CHOLECYSTOKININ STIMULATION. *(E.)* Minaire, Y.; Descos, L.; Daly, J. P.; Bererd, M. B.; lambert, R. (C. E. Herriot Hosp., Lyon, France). *Digestion* 9(1):8-20, 1973.

0980 RESERVE CAPACITY OF THE EXOCRINE PANCREAS. ENZYME SECRETION AND FECAL FAT ASSIMILATION IN THE 95% PANCREATECTOMIZED RAT. *(E.)* Hotz, J.; Goberna, R.; Clodi, P. H. (Ctr. Intern. Med. Pediatr., Univ. Ulm, Germany). *Digestion* 9(3):212-223, 1973.

0981 THE INHIBITION OF CANINE EXOCRINE PANCREATIC SECRETION BY INTRAVENOUS ETHANOL. *(E.)* Tiscornia, O.; Gullo, L.; Sarles, H. (INSERM, Dept. Pathol. Digestion, Marseille, France). *Digestion* 9(3):231-240, 1973.

0982 DISAPPEARANCE OF PANCREATIC PROTEINS FROM THE BLOOD CIRCULATION OF THE RAT. *(E.)* Machovich, R.; Naray, A.; Folly, G.; Papp, M. (Postgrad. Med. Sch., Budapest, Hungary). *Enzyme* 14(6):348-352, 1972/73.

0983 SECRETORY CHARACTERISTICS OF PANCREATIC γ-GLUTAMYL TRANSPEPTIDASE. *(E.)* Nakajima, S.; Toda, Y.; Hayakawa, T.; Suzuki, T.; Noda, A. (Nagoya Univ. Sch. Med., Japan). *Pfluegers Arch.* 345(4):271-279, 1973.

0984 EARLY DIFFERENTIATION OF GLUCAGON-PRODUCING CELLS IN EMBRYONIC PANCREAS: A POSSIBLE DEVELOPMENTAL ROLE FOR GLUCAGON. *(E.)* Rall, L. B.; Pictet, R. L.; Williams, R. H.; Rutter, W. J. (Dept. Biochem., Univ. California, San Francisco). *Proc. Natl. Acad. Sci. USA* 70(12):3478-3482, 1973.

0985 BASAL AND POSTPRANDIAL PANCREATIC SECRETION IN RATS. *(E.)* Shaw, H. M.; Heath, T. J. (Sch. Physiol., Univ. New South Wales, Kensington, Australia). *Q. J. Exp. Physiol.* 58(4):335-343, 1973.

0986 THE INFLUENCE OF 1-(5-OXOHEXYL-)3,7-DIMETHYLXANTHINE (BL 191) ON THE ENDOCRINE AND EXOCRINE PANCREATIC FUNCTION IN MAN DURING AND FOLLOWING SECRETIN AND CHOLECYSTOKININ-PANCREOZYMIN STIMULATION. *(E.)* Dollinger, H. C.; Raptis, S.; Grebe, B.; Goebell, H.; Muller, R.; Hinze, H. J.; Pfeiffer, E. F. (Center Internal Med. Pediatr., Univ. Ulm, Germany). *Res. Exp. Med.* 161(4):327-334, 1973.

0987 ISOENZYMES OF PANCREATIC TISSUE DURING ITS REGENERATION. *(Rus.)* Sheianov, G. G.; Surinov, B. P.; Ivashchenko, I. A. (Sci. Res. Inst. Med. Radiol., Obninsk, USSR). *Arkh. Patol.* 35(6): 57-62, 1973.

See also, 0944, 1085, 1193, 1410, 1411, 1412.

SECRETION AND METABOLISM

Hepatobiliary Tract

0988 METABOLIC FATE OF RAT AND HUMAN LIPOPROTEIN APOPROTEINS IN THE RAT. *(E.)* Eisenberg, S.; Windmueller, H. G.; Levy, R. I. (Natl. Inst. Arthritis, Metab., Dig. Dis., Bethesda, Md.). *J. Lipid Res.* 14(4):446-458, 1973.

The fate of ^{125}I-labeled apolipoproteins was studied *in vivo* in rats receiving i.v. injections of ^{125}I-labeled rat high-density lipoprotein and ^{125}I-labeled human high-density lipoprotein, low-density lipoprotein, very low-density lipoprotein. Plasma decay curves of rat and human high-density lipoprotein were exponential with similar half-lives in the circulation (11-12 hr). After injection, low molecular weight apolipoproteins (alanine of human high-density lipoprotein and fraction HS-3 of rat high-density lipoprotein) were found to redistribute to other lipoproteins, predominantly very low-density lipoproteins. Decay curves of individual high-density lipoproteins proteins were constructed after lipoprotein fractionation, delipidation, and polyacrylamide gel electrophoresis. The half-lives of the different high-density lipoproteins apoproteins were not identical. A major rat high-density lipoprotein protein (52% of total counts) had a circulating half-life of 12.5 hr. A circulating half-life of 8-9 hr was determined for 2 others while the half-life of several others was 11-12 hr. The half-life of 3 well-characterized human high-density lipoproteins apoproteins apolipoprotein-glutamine I, apolipoprotein-glutamine II, and apolipoprotein-alanine, were 13.5, 9.0, and 15.0 hr, resp. The fate of ^{125}I-labeled human very low-density lipoprotein and low-density lipoprotein apoproteins in rats was similar to that in humans. After injection of ^{125}I-labeled human very low-density lipoprotein into rats, apolipoprotein-glutamic acid and apolipoprotein-alanine rapidly transferred to rat high-density lipoprotein and were lost thereafter from the circulation from both very low-density lipoprotein and high-density lipoprotein. The apolipoprotein moiety of human very low-density lipoprotein moved metabolically to the low-density lipoprotein density range through a lipoprotein of intermediate density. Analysis of tissue radioactivity at time intervals after the injection of labeled lipoproteins suggests that the liver is important in the clearance of all lipoprotein preparations from plasma.

0989 GASTRIC CONTAMINATION BY SALIVARY MUCOUS SECRETIONS IN THE PYLOROUS-LIGATED RAT. *(E.)* Chayvialle, J. A.; Lambert, R. (E. Herriot H Hosp., Lyon, France). *Digestion* 8(6):497-508, 1973.

Contamination of the gastric juice of the rat by sulfated salivary mucosubstances was studied in pylorus-ligated male Wistar rats. The nondialyzable radiosulfate (NDRS) after proteolysis in saliva and gastric juice indexed the amount of sulfated mucosubstances present in them. The ligation of the esophagus evokes a strong decrease of the amount of NDRS in the gastric contents, while no significant variation of the NDRS is observed in the gastric wall. The simultaneous collection of saliva and gastric juice in the presence of an esophageal catheter shows that the NDRS in pure gastric juice reaches only 5% of the values in saliva. A higher percentage is obtained when the secretions are collected above (salivary) and under (gastric) a forestomach-fundus ligation, but the NDRS in pure gastric juice is still less than 20% of the amount collected in saliva. Histochemical and autoradiographic studies on the salivary glands did not reveal any sulfated components in the parotid, submaxillary, and major sublingual glands, while they were present in the accessory mucous glands. This was confirmed by the lack of effect of a salivary ducts ligation on the non-dialyzable radiosulfate content of the gastric juice. It is concluded that accessory mucous glands in the oral cavity play a major role in the mucous contamination of the gastric juice.

0990 THE RELATION OF PLASMA GASTRIN TO THE CIRCADIAN RHYTHM OF GASTRIC ACID SECRETION IN MAN. *(E.)* Moore, J. G.; Wolfe, M. (Univ. Utah Coll. Med., Salt Lake City). *Digestion* 9(2):97-105, 1973.

The relation of the circadian rhythm of basal acid secretion to fluctuations in plasma gastrin levels was studied in 10 healthy, young (ages 22-27) male volunteers from whom 24-hr basal gastric acid collections were obtained. The hourly secretory pattern, which described a circadian periodicity (low morning, high evening acid rates), was compared with mean plasma gastrin levels obtained at 4-hr intervals. No rhythm in plasma gastrin was detected over the 24-hr collection period and the circadian rhythm of basal and output is not due to fluctuations in the plasma gastria level.

0991 EFFECT OF PENTAGASTRIN AND SECRETIN ON GASTRIC MUCUS SECRETION IN CONSCIOUS CATS.

(E.) Vagne, H.; Argier, M. C. (Hosp. E. Herriot, Lyon, France). *Gastroenterology* 65(5):757-763, 1973.

Gastric mucus secretion was studied simultaneously with acid and pepsin secretion during pentagastrin and secretin stimulation in 3 conscious cats with Heidenhain pouch (HP) and gastric fistula (GF). Pentagastrin (32 μg/kg/hr) produced an increase of the volumes from GF and HP. Secretin (3 U/kg/hr) added to pentagastrin produced no change of the volume of gastric juice secreted by HP and a slight increase from GF. Acid output was strongly stimulated by pentagastrin. Secretin induced no change of acid output from HP and a slight decrease from GF. Pepsin concentration decreased during pentagastrin infusion and increased during secretion. Pepsin output increased during pentagastrin stimulation in GF and HP juices. Uronic acid concentration decreased in GF and HP juices during pentagastrin stimulation and increased with secretin. The ration of uronic acid to pepsin did not differ from basal during pentagastrin stimulation, while it decreased when secretin was added. Uronic acid output increased in GF and HP secretions during pentagastrin stimulation. Fucose and galactose concentrations fell significantly during pentagastrin infusion and showed a small increase during secretin. Fucose and galactose outputs from HP increased above basal level during pentagastrin stimulation. These results show that mucus secretion may occur independently of acid secretion and that gastrointestinal hormones play a role in regulating mucus secretion.

0992 IMPAIRMENT OF HEPATIC UPTAKE OF RIFAMYCIN ANTIBIOTICS BY PROBENECID, AND ITS THERAPEUTIC IMPLICATIONS.

(E.) Kenwright, S.; Levi, A. J. (Clin. Res. Ctr., Harrow, England). *Lancet* (7843):1401-1405, 1973.

Bilirubin uptake by the liver as affected by rifamycins and probenecid was studied in Homozygous Gunn rats. Hepatic uptake of BSP was studied in Sprague-Dawley rats. Both probenecid and rifamycins greatly prolong the initial plasma clearance for BSP *in vivo*, but neither compound displaced BSP from ligandin or Z acceptor proteins *in vitro*, indicating that competition for binding to these proteins cannot be the main mechanism for the impaired hepatic uptake of BSP found *in vivo*. Rifamycin-SV and probenecid had similar effects on bilirubin concentrations in the liver-cell fractions of Gunn rats; *in vivo*, supernatant, ligandin, and Z fraction bilirubin levels were all reduced by similar proportions. *In vitro* addition of very high doses of each drug to Gunn supernatant displaced bilirubin selectively from Z protein. Therefore, both BSP and bilirubin hepatic uptake is impaired by these drugs at an earlier step than the acceptor proteins, possibly at the plasma membrane level, which suggests that the drugs may compete at the same site. The uptake of rifamycin-SV and ^{14}C-rifampicin into the liver cell was depressed by probenecid. Thus, more of the antibiotic would be available for distribution to other tissues. Healthy male subjects (6, aged 24-40 yr), each received rifampicin (365 μmole p.o. twice, 2 or 3 days apart). Probenecid was administered 2 g at 20 min before the antibiotic and 1.5 g at 6 hr after. The serum-rifampicin levels were raised after treatment with probenecid, and the clearest effects of probenecid were noted before the second probenecid dose. It is suggested that a single-dose regimen of probenecid and rifampicin may be of therapeutic value in reducing rifampicin requirement in the treatment of tuberculosis.

0993 STUDY OF Y AND Z, TWO CYTOPLASMIC BILIRUBIN BINDING PROTEINS. THEIR DEVELOPMENT IN THE LIVER OF FOETAL AND NEWBORN WISTAR AND GUNN RATS.

(E.) Foliot, A.; Housset, E.; Ploussard, J. P.; Petite, J. P.; Infante, R. (Unit Biol. Res. Anim. Exp. Tech., I.N.S.E.R.M., Paris, France). *Biomedicine* 19(11):488-491, 1973.

The development of the hepatic cytoplasmic proteins Y and Z, recently identified as able to accept and/or carry bilirubin in the hepatocyte, was studied in Wistar rats and in Gunn rats (Wistar strain mutant) with inherited lack of glucuronyl-transferase. The protein fractions were measured in livers of 18- and 21-day old fetuses and rats aged 5, 10, 20, 30, and 60 days. In Wistar rats, Z protein (assessed by BSP binding) appears on day 21 of fetal life. After birth, Z increases rapidly until day 10, then increases more slowly and reaches adult level in about 20 to 30 days. The Y protein appears after birth and increases steadily, but reaches mature levels only in 60 days. In Gunn rats, Z protein is present on day 18 of fetal life. Its course of maturation then anticipates the course observed in Wistar rats. Y protein appears on day 20 of fetal life and reaches mature values on the 30th day after birth. There was no significant difference between the protein levels for the adults of the two strains. Because of high concentration and early presence in Gunn rat fetuses, it is suggested that bilirubin may stimulate Y and Z synthesis in the liver.

0994 EFFECTS OF LIPID PEROXIDATION ON ACTIVITIES OF DRUG-METABOLIZING ENZYMES IN LIVER MICROSOMES OF RATS.

(E.) Kamataki, T.; Kitagawa, H.; (Fac. Pharm. Sci., Chiba, Japan). *Biochem. Pharmacol.* 22(24):3199-3207, 1973.

The effects of lipid peroxidation on the activities of drug-metabolizing enzymes was investigated using livers from male Wistar rats. Increasing the ferrous ion increment in the incubation mixture increased lipid peroxidation and decreased ethylmorphine N-demethylating activity. EDTA (0.02 mM) stimulated apparent activity of aminopyrine N-demethylation up to about 2-fold. The activity gradually declined with increasing EDTA concentrations. The stimulation of aminopyrine N-demethylation correlated closely with the decrease in formation of lipid peroxide. Similar effects of EDTA were noted using ethylmorphine as a substrate. Ethylmorphine N-demethylation was stimulated by addition of inhibitors of lipid peroxidation. When microsomes were preincubated for varying lengths of time with a NADPH-generating system, a marked decrease in the demethylation of codeine and a concomitant increase in lipid peroxidation were observed. These results indicate that stimulation of lipid peroxidation delays the rate of drug oxidation and, conversely, that inhibition of lipid peroxidation accelerates that rate. While testing the effects of EDTA on the rate of ethylmorphine N-demethylation and lipid peroxidation, ethylmorphine inhibited lipid peroxidation with increasing concentration, 10 mM ethylmorphine inhibiting lipid peroxidation by about 70%. In the presence of complete inhibition of lipid peroxidation by EDTA, the rate of ethylmorphine N-demethylation was markedly increased. The apparent stimulation by EDTA was more pronounced if low concentrations of ethylmorphine were employed. Thus it is evident that the low concentrations of ethylmorphine only partly inhibit lipid peroxidation. It is assumed that addition of EDTA to the incubation mixture causes changes in the inhibition constants of drug-metabolizing enzymes by SKF 525-A, since EDTA produced apparent activation of drug-metabolizing enzymes and SKF 525-A has an ability to block lipid peroxidation. When ethylmorphine, aminopyrine and aniline were used as substrates, EDTA in all cases produced changes in the inhibition constants of SKF 525-A to smaller values.

0995 EFFECT OF STARVATION ON THE QUANTITATIVE CELL STRUCTURE OF RAT LIVER CELLS. I. ABSOLUTE STARVATION AND REFEEDING. *(Ger.)* Rohr, H. P.; Brunner, H. R.; Rasser, Y. M.; von Matt, C. A.; Riede, U. N. (Inst. Pathol., Univ. Basel, Switzerland). *Beitr. Pathol.* 149(4):347-362, 1973.

Morphometric analyses were performed on liver tissue from 10-week-old male Fisher rats which had been given water but no food for 3, 6, and 9 days and from rats which had been starved for 9 days and were then refed for 3 days. After 9 days of starvation the cell volume had decreased by 50%. The mitochondrial volume increased 7-fold, but the number of mitochondria in each liver cell decreased. After 3 days of starvation the area of the cristae per unit volume of mitochondria was decreased. A pronounced decrease occurred in the area of the smooth and rough endoplasmic reticula after 6-9 days of starvation. The percentage volume of lysosomes per liver cell doubled after 6 days of starvation and then gradually decreased. Morphological parameters of the liver cells normalized when starved rats were refed for 3 days, but the volume of liver cells and the area of the rough endoplasmic reticulum increased to values above normal. On the basis of these findings, changes in the ultrastructure of liver cells occurring as a result of starvation are classified into 2 stages. The first is a compensation stage which lasts until the 6th day of starvation and is characterized by retention and development of only those cell structures necessary for continued cell vitality. The increases in mitochondrial volume are apparently not only a swelling, but may also be due to membrane synthesis and changes in mitochondrial energy metabolism. The decompensation stage, which sets in after 6-9 days of starvation, is characterized by cellular autophagy and the dissolution of cell organelles in the hyaloplasm. The integrity of mitochondrial membranes is lost, and the mitochondria swell.

0996 DISTRIBUTION OF DIETARY ELAIDIC ACID IN SUBCELLULAR PARTICLES OF RAT LIVER. *(E.)* Sgoutas, D. S.; Jones, R.; Leight, M. (Emory Univ. Med. Sch., Atlanta, Ga.). *Int. J. Biochem.* 4(23): 437-445, 1973.

0997 CARBAMYLPHOSPHATE SYNTHETASES IN HUMAN LIVER. *(E.)* Grillo, M. A.; Pinna, G. G.; Casolo, L. (Inst. Chem. Biol., Univ. Sassari, Italy). *Int. J. Biochem.* 4(23):447-450, 1973.

0998 LIVER METABOLISM OF IMMUNOREACTIVE ENDOGENOUS GASTRIN IN DOG. *(Fr.)* Bali, J.; Balmes, J.; Sellami, A.; Fournajoux, J.; Cayrol, B.; Khazrai, H. (Hosp. Saint-Eloi, Montpellier, France). *Biol. Gastroenterol. (Paris)* 6(Supp. 2):129-132, 1973.

0999 HEPATIC UPTAKE AND BILIARY EXCRETION OF TETRACYCLINE IN THE RAT. *(E.)* Lanman, R. C.; Muranishi, S.; Schanker, L. S. (Univ. Missouri-Kansas City). *Am. J. Physiol.* 225(5):1240-1246, 1973.

1000 STUDIES ON THE MECHANISM OF BILIARY EXCRETION OF ARYL SULPHATES IN THE RAT. *(E.)* Powell, G. M.; Gregory, P. A.; Olavesen, A. H.; Jones, J. G. (Univ. Coll. Dept. Biochem., Cardiff, Wales). *Biochem. Soc. Transact.* 1(5):1165-1168, 1973.

1001 CAPACITY OF REGENERATION IN LIVER EPITHELIA OF JUVENILE, REPEATED PARTIALLY HEPATECTOMIZED RATS. AUTORADIOGRAPHIC STUDIES AFTER CONTINOUS INFUSION OF ^{3}H-THYMIDINE. *(Ger.)* Stocker, E.; Wullstein, H. K.; Brau, G. (Inst. Pathol. Univ. Warzburg, Germany). *Virchows Arch. [Zellpathol.]* 14(2):93-103, 1973.

1002 EFFECT OF THYROIDECTOMY ON CIRCULATING COMPONENTS AND LIVER METABOLISM IN FED AND FASTED RATS. *(E.)* Castro, M.; Herrera, E. (Inst. G. Maranon, C.S.I.C. Madrid, Spain). *Hormone Res.* 4(6):357-366, 1973.

1003 EFFECT OF PROSTAGLANDIN E_1 ON CHOLESTEROL BIOSYNTHESIS IN RAT LIVER. *(E.)* Calandra, S.; Montaguti, M. (Inst. Gen. Pathol., Modena, Italy). *Experientia* 29(11):1361-1362, 1973.

1004 THE NATURE OF THE REVERSE TYPE I (MODIFIED TYPE II) SPECTRAL CHANGE IN LIVER MICROSOMES. *(E.)* Schenkman, J. B.; Cinti, D. L.; Orrenius, S.; Modeus, P.; Kraschnitz, R. (Yale Univ. Sch. Med., New Haven, Conn.). *Biochemistry* 11(23):4243-4251, 1972.

1005 EFFECT OF BLOOD FROM PARTIALLY HEPATECTOMIZED RATS ON PROTEIN METABOLISM IN THE ISOLATED AND PERFUSED LIVER. I. STUDY OF THE ANABOLIC ASPECTS. *(It.)* Trentalance, A.; Leoni, S.; Spagnuolo, S.; Mangiantini, M. T. (Inst. Gen. Physiol., Univ. Rome, Italy). *Boll. Soc. Ital. Biol. Sper.* 48(20):645-647, 1972.

1006 THE EFFECT OF FAT QUALITY IN DIET ON RAT LIVER. III. HISTOENZYMATIC CELLULAR MARKERS: ACID PHOSPHATASE. *(Pol.)* Opuszynska, T. (Inst. Food Nutrition, Warsaw, Poland). *Rocz. Panstw. Zakl. Hig.* 24(3):343-351, 1973.

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See also, 0881, 0883, 1125, 1127, 1134, 1420, 1437, 1437, 1458, 1509, 1523, 1524.

SECRETION AND METABOLISM

Intestine

1064 EFFECT OF FASTING ON CARBOHYDRATE MOIETY OF GUINEA PIG INTESTINAL BRUSH BORDERS. *(E.)* Bouhours, J. F.; Andre, F.; Guignard, H.; Lambert, R. (Hosp. Edouard Herriot, Lyon, France). *Digestion* 9(4):309-316, 1973.

Albino guinea pigs subjected to fasting for 2 days were compared with controls subjected to fasting for 1 day and fed for 1 day. Weight, protein content, and sucrase activity of intestinal mucosa were lowered. Analysis of carbohydrate moiety of isolated brush borders by gas-liquid chromatography and colorimetric methods revealed an increase of fucose, sialic acid, and sulfate with fasting conditions mainly in the proximal part of intestine. Glucose, however, tended to decrease, and other neutral and amino sugars did not change. It is concluded that fucose, sialic acid, and sulfate groups increase in the cell membrane when the cell-renewal rate decreases.

1065 INTESTINAL VERSUS HEPATIC CONTRIBUTION TO CIRCULATING TRIGLYCERIDE LEVELS. *(E.)* Cenedella, R. J.; Crouthamel, W. G.; Mengoli, H. F. (West Virginia Univ. Med. Ctr., Morgantown). *Lipids* 9(1):35-42, 1974.

Using i.v. injected [2-^{3}H] glycerol, measurements were made of the kinetics of appearance and disappearance of circulating [^{3}H] labeled triglyceride in male Sprague-Dawley rats fed a fat-free diet containing no orotic acid (controls) or 2% orotic acid. Following injection of [^{3}H] glycerol, more time is required for the initial appearance of [^{3}H] triglyceride in the circulation of orotic acid-treated rats than controls. The sustained entry of triglyceride into the circulation of orotic acid-fed rats was only one-half times as rapid as that seen for control rats. About 10% as much [^{3}H] triglyceride entered the circulation of the orotic acid-treated rats as compared with controls. However, the clearance of [^{3}H] triglyceride from the circulation of the orotic acid-fed rat was only about one-half times as rapid as that of the control rat. This apparently is due to differences between the lipoproteins produced by the intestines and liver, rather than to changes in the ability of the orotic acid fed animal to clear lipoprotein-triglyceride from the circulation. Labeled lipoproteins taken from controls and injected into orotic acid-treated rats were cleared from the circulation more than twice as rapidly as those taken from orotic acid-fed rats and injected into controls. Considering the measured levels of plasma triglyceride synthesis and the slower turnover of the triglycerides produced by the orotic acid fed rat, this study indicated that the intestines supply 20% or more of the total plasma triglyceride in the absence of dietary fat.

1066 MEASUREMENT OF ENDOGENOUS RELEASE OF CHOLECYSTOKININ BY RADIOIMMUNOASSAY. *(E.)* Reeder, D. D.; Becker, H. D.; Smith, N. J.;

Rayford, P. L.; Thompson, J. C. (Dept. Surg., Univ. Texas Med. Branch, Galveston). *Ann. Surg.* 178(3):304-310, 1973.

A radioimmunoassay technique has been developed for measuring circulating levels of endogenous cholecystokinin in man and in dogs. There is no cross reaction with gastrin. Using this assay increases were detected in serum concentrations of cholecystokinin following a fatty meal in man, and during application of acid or an amino acid mixture to small bowel mucosa in dogs. Concentrations of cholecystokinin were almost the same in duodenal and jejunal mucosa and were significantly higher than in the ileal mucosa. This radioimmunoassay for cholecystokinin should be useful in delineating the overlapping actions of the gastrointestinal hormones in physiologic studies.

1067 ACID LOSS IN THE HUMAN DUODENUM: VOLUME CHANGE, OSMOLAL LOSS, AND CO$_2$ PRODUCTION IN RESPONSE TO ACID LOADS. *(E.)* Winship, D. H.; Robinson, J. E. (Univ. Missouri Sch. Med., Columbia). *Gastroenterology* 66(2):181-188, 1974.

Isotonic hydrochloric acid solutions of different pH were infused into the proximal duodena of normal males to investigate the relationship between the amount of acid infused, acid loss from the duodenum, and chemical neutralization of acid in the duodenal lumen. From samples aspirated at 15 cm and 30 cm downstream, some relationships between acid load, acid loss, and chemical neutralization of acid in the duodenal lumen were studied. At infusions with solutions of pH 1, pH 2, and pH 3, gain of fluid was recognized; the gain in the lumen increased progressively with increase in infused acid load. Duodenal fluid Pco$_2$ levels increased markedly during pH 1 and pH 2 infusions; values up to 700 mm Hg were recorded. Osmolality of duodenal fluid decreased as a result of the neutralizing reaction between acid and bicarbonate during pH 2 and pH 1 infusions. The major changes were observed in the proximal duodenal segment; Pco$_2$, and osmolality reverted toward normal in the distal segment. Level of Pco$_2$ and degree of decrease in osmolality were similarly related to the amount of acid lost from the duodenum and exhibited a strong mutual correlation, reflecting their common origin in the chemical neutralization of HCl with endogenous bicarbonate. Almost all acid loss occurred in the proximal duodenal segment. If acid entered the distal segment it evoked a further secretion of fluid; otherwise, net absorption occurred in the segment. It seems likely that the fluid gained in the lumen neutralized the acid.

068 IMMUNE RESPONSES IN INTESTINAL TISSUE TO PARTICULATE ANTIGENS. DEVELOPMENT OF CELLS FORMING DIFFERENT CLASSES OF ANTIBODY IN PRIMARY AND SECONDARY RESPONSES. *(E.)* Robertson, P. W.; Cooper, G. N. (Sch. Microbiol., Univ. New South Wales, Kensington, Australia). *Aust. J. Exp. Biol. Med. Sci.* 51(5):575-587, 1973.

Characteristics of immune responses resulting from antigenic stimulation via the intestinal epithelium were examined by enumerating rosette-forming cells synthesizing IgM, IgG, and IgA antibodies. These cells arose in local and peripheral lymphoid tissues in both primary and secondary responses. The primary response of mesenteric lymph nodes was similar in general to that observed in the spleen or other lymph nodes when antigen is given parenterally, showing the characteristic change from IgM to IgG antibody formation. In the intestinal submucosa and lamina propria IgA-rosette-forming cells were the most numerous, but a significant IgG response was also noted. Following immunization via the intestinal route, IgA-rosette-forming cells also appeared in the spleen. This route of immunization primes animals to respond to later antigenic stimulation given either via the intestine or parenterally. This primed state lasts at least 14 weeks. The greatest secondary response occurred in the mesenteric lymph nodes where IgM-rosette-forming cells predominate. In the intestinal lamina propria and submucosa the IgM-rosette-forming cells secondary response was substantially greater than that of IgG- and IgA-rosette-forming cells. Priming via the intestinal route led to a significant IgA-rosette-forming cells response in the spleen, irrespective of whether the second injection was i.v. or given intestinally. This suggests that the entry of antigen from the intestine gives rise to a substantial population of memory cells in the spleen, committed to IgA antibody formation. Whether these cells develop in the spleen or in the intestinal tissues and subsequently migrate to the spleen is open to question.

1069 DISACCHARIDASES IN THE SMALL INTESTINE OF THE MOUSE: NORMAL DEVELOPMENT AND INFLUENCE OF CORTISONE, ACTINOMYCIN D, AND CYCLOHEXIMIDE. *(E.)* Moog, F.; Denes, A. E.; Powell, P. M. (Dept. Biol., Washington Univ., St. Louis, Mo.). *Dev. Biol.* 35(1):143-149, 1973.

The development of maltase, sucrase, and lactase activity was examined in the small intestine of mice. Maltase increased during 2 days before birth and then remained unchanged for 14 days, after which activity surged throughout the intestine. Sucrase was absent during the first 14 days, but then rose in a pattern similar to maltase. Both enzymes rose faster in the proximal third of the intestine. Lactase, which is high in the infant intestine, falls after 12 days in the proximal segment, but only after 16 days in the more posterior segments. Cortisone, administered at 8 days, caused maltase activity to rise for at least 72 hr. At 4 days the same treatment caused an increase for only 48 hr. Sucrase activity was elicited by cortisone at 8 days, but not at 4. Between days 10 and 13, both actinomycin D and cycloheximide evoked significant increases of both maltase and sucrase activity in all regions of the intestine. When administered in concert with cortisone, actinomycin D inhibited the stimulatory influence of the hormone on sucrase. Significant inhibition of maltase activity occurred only in the mid third of the intestine. Cycloheximide did not interfere with the cortisone effect. No additive effects between hormone and antibiotics were observed. These facts suggest that the infant epithelium may, under normal conditions, be restrained from undergoing maturation before the sensory and neuromuscular systems have differentiated sufficiently to permit the young animals to seek their own food independently of the mother. This suggests that the common action of the agents used in this study may have been to inhibit a repressor needed to preserve the infant condition.

1070 PATHOPHYSIOLOGICAL RESPONSE OF RABBIT JEJUNUM TO ESCHERICHIA COLI ENTEROTOXIN.

(E.) Sherr, H. P.; Banwell, J. G.; Rothfeld, A.; Hendrix, T. R. (Johns Hopkins Univ., Sch. Med., Baltimore, Md.). *Gastroenterology* 65(6):895-902, 1973.

A soluble cell-free entertoxin with secretory activity in the rabbit loop was prepared from a serotype of *Escherichia coli* isolated from an adult Indian patient with acute undifferentiated diarrhea. *E. coli* enterotoxin-stimulated jejunal secretion was maximal within 30 min of exposure, compared with a gradual increase in the rate of secretion after cholera toxin exposure. The electrolyte composition of the secreted fluid was similar to that of an electrolyte solution which had come to equilibrium within the jejunal lumen and to fluid secreted in response to cholera toxin exposure. The blood to lumen unidirectional flux of ^{22}Na and $^{3}H_2O$ increased significantly after exposure to both enterotoxins, while the lumen to blood flux did not change. Active transport of glucose and glycine after *E. coli* exposure decreased when compared with the unstimulated intestine, suggesting that *E. coli* enterotoxin or closely associated soluble products alter active transport processes as well as stimulate secretion. Thus, replacement with oral glucose-glycine solutions may not be particularly useful in acute undifferentiated diarrhea due to toxigenic *E. coli*. The similar effects on fluid secretion and unidirectional fluxes observed after *E. coli* and cholera enterotoxin exposure suggest stimulation of a common secretory process. However, differences in active transport-mediated absorption of glucose and glycine indicate a fundamental difference in the physiological activity of the molecule or associated soluble products.

1071 CHARACTERIZATION OF ILEAL VITAMIN B_{12} BINDING USING HOMOGENEOUS HUMAN AND HOG INTRINSIC FACTORS.

(E.) Hooper, D. C.; Alpers, D. H.; Burger, R. L.; Mehlman, C. S.; Allen, R. H. (Washington Univ. Sch. Med., St. Louis, Mo.). *J. Clin. Invest.* 52(12):3074-3083, 1973.

Homogenous human intrinsic factor and hog intrinsic factor isolated by affinity chromatography were used to study [^{57}Co]-vitamin B_{12} binding to ileal mucosal homogenates. Human intrinsic factor-vitamin B_{12} and hog intrinsic factor-vitamin B_{12} were bound to human, monkey, hog, dog, rabbit, mouse, hamster, and guinea pig ileal, but not jejunal, homogenates in amounts significantly greater than free B_{12} or vitamin B_{12} bound to 5 other homogenous B_{12}-binding proteins. Only intrinsic factor-mediated B_{12} binding was localized to ileal homogenates and was inhibited by ethylenediaminetetraacetic acid. Values for the association for the various ileal homogenates and human intrinsic factor-B_{12} and hog intrinsic factor-B_{12} ranged from $0.3 \times 10^{9}M^{-1}$ to $13.0 \times 10^{9}M^{-1}$. Apparent differences in the association constant for human intrinsic factor-B_{12} and hog intrinsic factor-B_{12} existed in most species. The number of ileal intrinsic factor-B_{12} binding sites/g (wet weight) of ileal mucosa ranged from 0.3 to 10^{12} to 4.9×10^{12}. The same value was always obtained with human intrinsic factor-B_{12} and hog intrinsic factor B_{12} for any given homogenate preparation. Excesses (100-fold) of free B_{12} or human intrinsic factor and hog intrinsic factor devoid of B_{12} did not significantly inhibit human intrinsic factor-B_{12} or hog intrinsic factor-B_{12} binding to human and hog ileal homogenates. Experiments performed with homogeneous intrinsic factor indicated that gastric factors other than intrinsic factor are not required for B_{12} binding to ileal binding sites. The mechanism of ileal intrinsic factor-B_{12} binding differs from that of free B_{12} or of B_{12} bound to non-intrinsic factor-B_{12} binding proteins. Human intrinsic factor and hog intrinsic factor have different structures. Human intrinsic factor-B_{12} and hog intrinsic factor-B_{12} bind to the same ileal binding sites. Human and hog ileal intrinsic factor-B_{12} binding sites bind free B_{12} and human and hog intrinsic factor devoid of B_{12} poorly, if at all.

1072 INFLUENCE OF THE PROTEIN CONTENT OF A MEAL ON POSTPRANDIAL PH AND PCO_2 IN THE HUMAN DUODENUM.

(E.) Rune, S. J. (Gentofte Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 8(7):605-608, 1973.

The pH and pCO_2 were measured in small samples of duodenal contents, aspirated from the second part of the duodenum each 15 min for 4 hr, after a meal. The study comprised 10 patients, 4 with duodenal ulcer and 2 with X-ray negative dyspepsia. Each of the 10 was given a liquid test meal on 2 subsequent days. The protein content was 7 cal% on one day and 25 cal% on the other, in randomized order. During the second and the third postprandial hr the duodenal pH was around 0.7 units lower after the high-protein than after the low-protein meal, while no significant difference was found in the first and fourth hr. The pCO_2 was very high after both meals, around 500 mm Hg, and was slightly higher after the high-protein meal than after the low, during the third and fourth hr. It is concluded that the influence of the protein content of the meal on duodenal pH must be due to the different titratable acidity of the gastric contents more than to the difference in pH of these contents.

1073 DUODENAL IMMUNOGLOBULIN LEVELS IN THE FIRST TWO YEARS OF LIFE.

(E.) Ansaldi, N.; Musso, A.; Marengo, M. L., Santini, B. (Clin. Pediatr., Univ. Torino, Italy). *Biomedicine* 19(10): 435-437, 1973.

Immunoglobulin levels, IgA, IgG, and IgM, in duodenal juice were studied in 71 healthy infants, aged 0-2 yr. Comparison was made to a group of 19 children, aged 2-9 yr. During the first week of life only IgG was constantly present in the jejunal juice at a concentration which proved constant at all the ages studied. The youngest child in which IgA and IgM were found was 7 days old. IgA increased in quantity from 8-10 days, reaching constant values in the second half of the first year of life. IgM concentrations increased in a more rapid and uniform way after the first week till the second year of life. Later IgM content fell rapidly and significantly to values constant for subsequent ages studied. Thus it is concluded that IgG is much the same in concentration for all ages of life, IgA increases during the first year and then remains constant, and IgM follows a 2-phase course, increasing the first 2 years and then decreasing to remaining life values. It is suggested that the lack of IgA and IgM in the eonate duodenal juice may explain the high incidence of infections at that age mostly due to Gram egative bacteria. Whether the variation of the pattern of the jejunal IgM corresponds to modifications of the antigenic composition of the intestinal tract or to a modification in the type of the subject's antibody response is unclear. It is suggested that these data may be useful in immunological investigations of children with gastrointestinal diseases.

074 METHYLATION OF INORGANIC MERCURY IN EXPERIMENTAL JEJUNAL BLINDLOOP. *(E.)* bdulla, M.; Arnesjo, B.; Ihse, I. (Univ. Hosp. und, Sweden). *Scand. J. Gastroenterol.* 8(6): 65-567, 1973.

075 EFFECT OF LOCALLY ADMINISTERED ENDOTOXIN ON REGENERATING APPENDIX STRUCTURE AND ESPONSES OF APPENDIX CELLS TO MITOGENS. *(E.)* lythman, H. E.; Waksman, B. H. (Yale Univ. Med. ch., New Haven, Conn.). *J. Immunol.* 3(4):1081-085, 1973.

076 THE EFFECT OF SOME ENZYME PREPARATIONS INTENDED FOR USE IN THE FOOD INDUSTRY ON THE ICROFLORA OF THE ALBINO RAT INTESTINE. *(Rus.)* uzechkin, A. N. (Inst. Nutrition, Moscow, USSR). *ppr. Pitan.* (5):65-69, 1973.

77 ON THE IDENTITY BETWEEN THE SMALL INTESTINAL ENZYMES PHLORIZIN HYDROLASE AND GLYCO-LCERAMIDASE. *(E.)* Leese, H. J.; Semenza, G. iochem. Lab. Federal Technical Coll., Zurich, Switerland). *J. Biol. Chem.* 248(23):8170-8173, 1973.

78 RELATIONSHIP BETWEEN INTRADUODENAL LIPOLYSIS AND GASTRIC EMPTYING. *(E.)* Fernandez, B.; Gonzalez, E.; Marzi, A. (Dept. Biol. Invest., enos Aires, Argentina). *Acta Gastroenterol. tinoam.* 5(2):57-60, 1973.

79 EFFECTS OF INSULIN ON GLUCOSE METABOLISM IN VASCULAR AND INTESTINAL SMOOTH MUSCLE. *(E.)* Arnqvist, H. J. (Sch. Med., Linkoping, Sweden). *Acta Pharmacol. Toxicol.* 33(5-6):459-469, 1973.

1080 REGIONAL DIFFERENCES IN HISTOLOGICALLY DETERMINED ENZYME ACTIVITIES IN THE RAT COLON AS RELATED TO FUNCTIONAL CHARACTERISTICS. *(Ger.)* Hohn, P.; Schafer, A.; Hohle, K. D. (Pathol. Inst., Johannes Gutenberg Univ., Mainz, Germany). *Anat. Anz.* 134(4):328-338, 1973.

1081 Na-Ca SITES IN THE LOGITUDINAL SMOOTH MUSCLE OF THE GUINEA-PIG ILEUM AND THE ACTION OF DRUGS. *(E.)* Burton, J.; Godfraind, T. (Lab. Pharmacodyn., Univ. Louvain, Belgium). *Arch. Int. Pharmacodyn.* 204(1):184-186, 1973.

1082 GLYCYL-L-LEUCINE HYDROLASE, A VERSATILE 'MASTER' DIPEPTIDASE FROM MONKEY SMALL INTESTINE. *(E.)* Das, M.; Radhakrishnan, A. N. (Christian Med. Coll. Hosp., Vellore, India). *Biochem. J.* 135(4):609-615, 1973.

1083 AROMATIC AMINO ACID TRANSAMINASE IN RAT INTESTINE. *(E.)* Nakamura, J.; Noguchi, T.; Kido, R. (Wakayama Med. Coll., Japan). *Biochem. J.* 135(4):815-818, 1973.

1084 A NEW GENERAL METHOD FOR THE ASSESSMENT OF THE MOLECULAR WEIGHT DISTRIBUTION OF POLYDISPERSE PREPARATIONS. ITS APPLICATION TO AN INTESTINAL EPITHELIAL GLYCOPROTEIN AND TWO DEXTRAN SAMPLES, AND COMPARISON WITH A MONODISPERSE GLYCOPROTEIN. *(E.)* Gibbons, R. A.; Dixon, S. N.; Pocock, D. H. (Agr. Res. Council Inst., Compton, England). *Biochem. J.* 135(4):649-655, 1973.

1085 CONCURRENT STUDIES OF THE FLOW OF DIGESTA IN THE DUODENUM AND OF EXOCRINE PANCREATIC SECRETION OF CALVES. 2. THE EFFECTS OF ADDITION OF FAT TO SKIM MILK AND OF 'SEVERE' PREHEATING TREATMENT OF SPRAY-DRIED SKIM-MILK POWDER. *(E.)* Ternouth, J. H.; Roy, J. H. B.; Siddons, R. C. (Natl. Inst. Res. Dairying, Reading, England). *Br. J. Nutr.* 31(1):13-26, 1974.

1086 SIGNIFICANCE OF THE SMALL INTESTINE IN LIPOPROTEIN METABOLISM AND ITS RELATION TO ATHEROGENESIS. *(Cz.)* Valek, J. (Res. Ctr. Metabolism Digestion, Prague, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 27(2):103-107, 1973.

1087 CONJUGATION OF BROMOSULPHTHALEIN (BSP) WITH REDUCED BLUTHATHIONE IN THE GASTRO-INTESTINAL TRACT IN VERTEBRATE SPECIES. *(E.)* Datta, D. V.; Singh, S.; Chhuttani, P. N. (Postgrad. Inst. Med. Ed. Res., Chandigarh, India). *Clin. Chim. Acta* 49(2):247-249, 1973.

1088 THE METABOLISM OF THE SMALL INTESTINE: DIETARY INDUCTION, SUBCELLULAR DISTRIBUTION AND ISOENZYME PATTERN OF SOME KEY ENZYMES OF GLUCOSE METABOLISM IN OVINE JEJUNAL MUCOSA. *(E.)* Wahle, K. W. J. (Dept. Agr. Biochem., Univ. Newcastle Upon Tyne, England). *Comp. Biochem. Physiol. [B]* 46(4):727-739, 1973.

1089 LYMPH DRAINAGE OF THE RECTUM IN MAN AND CERTAIN MAMMALS. *(E.)* Kocisova, M.; Munka, V. (Fac. Med. Safarik Univ., Kosice, Czechoslovakia). *Folia Morphol. (Praha)* 21(4):414-416, 1973.

1090 PROGRESS REPORT. IS SECRETIN SECRETED? *(E.)* Wormsley, K. G. (Maryfield Hosp., Dundee, Scotland). *Gut* 14(9):743-751, 1973.

1091 LIPOLYTIC ACTION OF A NEWLY ISOLATED VASOACTIVE INTESTINAL POLYPEPTIDE. *(E.)* Frandsen, E. K.; Moody, A. J. (Novo Res. Inst., Copenhagen, Denmark). *Horm. Metab. Res.* 5(3): 196-199, 1973.

1092 CHANGES IN THE ADENINE NUCLEOTIDE CONTENT OF PREPARATIONS OF THE RAT SMALL INTESTINE IN VITRO. *(E.)* Bronk, J. R.; Leese, H. J. (Dept. Biol., Univ. York, England). *J. Physiol.* 235(1): 183-196, 1973.

1093 THE EFFECT OF CHRONIC PROTEIN DEFICIENCY ON INTESTINAL MUCOSAL GRANULOCYTES IN THE RAT. *(E.)* Nelson, D. P.; Newberne, P. M. (Dept. Nutr., Massachusetts Inst. Tech., Cambridge). *Nutr. Rep. Int.* 8(5):283-300, 1973.

1094 A SEARCH FOR EMBRYONIC ANTIGENS IN REGENERATING INTESTINE OF THE ADULT LEOPARD FROG, RANA PIPIENS. *(E.)* Donaldson, D. J.; Minchey, J. W.; Adcock, K. (Univ. Tennessee Med. Units, Memphis). *Oncology* 28(6):523-535, 1973.

1095 POSSIBLE INFLUENCE OF VITAMIN B_{12}-BINDING PROTEIN IN MILK ON THE INTESTINAL FLORA IN BREAST-FED INFANTS. I. B_{12}-BINDING PROTEINS IN HUMAN AND BOVINE MILK. *(E.)* Gullberg, R. (Dept. Rheumatol., Karolinska Inst., Stockholm, Sweden). *Scand. J. Gastroenterol.* 8(6):497-503, 1973.

See also, 0817, 0846, 0880, 0883, 0962, 1098, 1101, 1340, 1341, 1342, 1369, 1371.

GENERAL

1096 FAILURE OF ISCHEMIA TO BREAK THE DOG'S GASTRIC MUCOSAL BARRIER. *(E.)* Davenport, H. W.; Barr, L. L. (Dept. Physiol., Univ. Michigan, Ann Arbor). *Gastroenterology* 65(4):619-624, 1973.

Vagally denervated (Heidenhain) pouches of the dog's oxyntic gland area of the stomach were irrigated with 100 mN HCl. Net fluxes of hydrogen and sodium ions, together with aminopyrine clearances, were measured. An increase in output of sodium ions and an increase in disappearance of hydrogen ions, in absence of secretion, were studied as possible measures of damage to the gastric mucosal barrier. Ischemia was produced by repeated injection of vasopressin (20 U every 30 min, s.c.), by a single hemorrhage (30% of blood volume), by repeated hemorrhages holding the dog's mean arterial blood pressure at 80 mm Hg, and by infusion of vasopressin (4 U/hr, i.v.) or norepinephrine (2-μg base/kg-hr). Infusion of vasoconstrictor drugs was combined with infusion of histamine (50-μg base/kg-hr), bethanechol chloride (50μg/kg-hr), or pentagastrin (8μg/kg-hr). Ischemia lasting 4, 5, or 6 hr had no effect on the integrity of the gastric mucosal barrier. Repeated injection of vasopressin, s.c., or a single, rapid hemorrhage did not induce ischemia lasting longer than 5 to 6 hr. When histamine or bethanechol and pentagastrin were given, the vasoconstrictor drugs were unable to cause lasting mucosal ischemia.

1097 MEASUREMENT OF DUAL HEPATIC BLOOD FLOW IN AWAKE PATIENTS. *(E.)* Strandell, T.; Erwald, R.; Kulling, K. G.; Lundbergh, P.; Marions, O.; Wiechel, K. L. (St. Erik Hosp., Stockholm, Sweden. *Appl. Physiol.* 35(5):755-761, 1973.

Dual hepatic blood flow was measured in 8 patients (6 men and 2 women with overt or suspect hepatic, biliary, or pancreatic disease) in whom a portal vein catheter was introduced through the reopened umbilical vein for direct selective portography. By use of a multiple-catheter technique blood flows were measured by constant infusion of indicator in the splenic artery, splenic vein, or the superior mesenteric vein. The concentration of indicator was measured in blood from the splenic vein, the right and left portal vein branches, a hepatic vein, and peripheral artery. ^{133}Xe was preferred as indicator and its mixing with blood within the main portal trunk was generally satisfactory. The equilibration over the liver took 4 min and the portal and hepatic vein blood flows were reproduced with an error of 5.5 and 8.1%, resp. Hepatic vein blood flows corresponded well to values obtained by the Bradley technique. Portal vein blood flow varied from 0.82 to 2.00 liters/min and hepatic artery flow from 15 to 56% of total hepatic flow. The 2 patients in whom no hepatic or abdominal disease could be proved had low hepatic artery flow values.

1098 CARDIOVASCULAR EFFECTS OF BLOOD BORNE MATERIAL RELEASED FROM THE CAT SMALL INTESTINE DURING SIMULATED SHOCK CONDITIONS. *(E.)*

Haglund, U.; Lundgren, O. (Dept. Physiol., Univ. Goteborg, Sweden). *Acta Physiol. Scand.* 89(4):558-570, 1973.

Cardiac performance was studied in 17 cats during and after a mimicked shock situation in the small intestine (regional hypotension at 35 mm Hg during nervous vasoconstrictor fiber activation). Aortic blood flow was measured with an electromagnetic flow probe around the ascending aorta and, in some experiments, maximal dP/dt of the left ventricle was also followed. Upon restoration of intestinal perfusion pressure after a 2 hr "shock" period a rapid reduction of aortic flow occurred due to a decreased stroke volume. Concomitantly maximal dP/dt was reduced in the face of an unchanged central venous pressure and left end diastolic pressure. This decline of cardiac performance could be prevented by substituting, during the first post-hypotensive min, the intestinal venous blood with fresh blood from a healthy donor animal. However, when the shed intestinal venous blood was retransfused, a rapid decline of cardiac performance was evident. The reduced cardiac function was accompanied by an unchanged or slightly elevated total peripheral resistance. It is proposed that substances released from the "shocked" intestine cause a rapid and pronounced depression of cardiac function.

1099 COLLECTION OF LYMPH FROM DOG JEJUNAL ALLOTRANSPLANT. I. CELL TRANSFORMATION AND LYMPHOCYTOTOXICITY AGAINST THE HOST. *(E.)*

Olszewski, W.; Plucinski, S. (Exp. Clin. Med. Ctr., Polish Acad. Sci., Warsaw). *Eur. Surg. Res.* 5(4):311-319, 1973.

To study the changes in jejunal allograft lymph reflecting changes in the rejected transplant, an experimental setting was designed in dogs consisting of a segmental transplant of the jejunum to the neck and an external lymphatic fistula of the graft. Cellular studies of graft lymph from the 5 recipients revealed the appearance of blast cells on day 2 and degenerative forms of lymphocytes on day 5. Serological studies revealed increasing cytotoxic titers to the host lymphocytes from the 2nd day on. Peak values were reached at least 2 days before clinical signs of graft rejection were seen. This study proves the existence of an activating immunological response of the allografted intestinal lymphoid tissue (a graft *versus* host reaction in intestinal allotransplants).

1100 ENZYMATIC DEAMIDATION OF THE C-TERMINAL TETRAPEPTIDE AMIDE OF GASTRIN BY MAMMALIAN TISSUES. *(E.)*

Walsh, J. H.; Laster, L. (Natl. Inst. Arthritis Metabolic Dis., Bethesda, Md.). *Biochem. Med.* 8(3):432-449, 1973.

An amidase activity was detected in male Sprague-Dawley rat tissue which catalyzes deamidation of the phenylalanine amide of the biologically active C-terminal tetrapeptide amide fragment of gastrin (Try-Met-Asp-Phe-NH$_2$) to produce the biologically inactive tetrapeptide free acid. Because an interfering aminopeptidase that acts on the C-terminal tetrapeptide amide was widespread in rat tissues, *N*-acylated t-butyloxycarbonyl (BOC)-tetrapeptide amide was used as the substrate for studying the amidase activity. Identification of BOC-tetrapeptide free acid as a product of the amidase reaction was achieved by thin-layer chromatography. The reaction product was a substrate for carboxypeptidase A, which catalyzes liberation of phenylalanine from BOC-tetrapeptide free acid but not from BOC-tetrapeptide amide. A quantitative assay was developed to measure the generation of BOC-tetrapeptide free acid; this product and ammonia were produced in equivalent amounts during the reaction. The enzyme activity was concentrated in the microsomal cell fraction. The pH optimum for the reaction was approximately 6.7. Liver was a rich source of the amidase activity in the rat; this activity was also present in small intestinal mucosa, stomach mucosa, and pancreas of the rat and of the hamster, cat, and dog. Another enzymatic activity, most abundant in rat kidney, was found to catalyze hydrolysis of the peptide bond between methionine and aspartic acid of BOC-tetrapeptide amide. The amidase activity and the peptidase activity identified in the kidney may contribute to the inactivation of gastrin or of its biologically active degradation products *in vivo*.

1101 VASCULAR REACTIONS IN THE SMALL INTESTINE DURING VASODILATATION. *(E.)*

Biber, B.; Fara, J.; Lundgren, O. (Dept. Physiol., Univ. Goteborg, Sweden). *Acta Physiol. Scand.* 89(4):449-456, 1973.

Reactions within the consecutive vascular sections of the small intestine of the cat were studied in 25 cats during vasodilatations induced by secretin and cholecystokinin, infused intraarterially or released endogenously, or by transmural electrical field and mucosal mechanical stimulations. All these potentially physiological stimuli evoked a response pattern similar to that of intraarterially infused 5-hydroxytryptamine and characterized by a relaxation of the resistance vessels as well as of the precapillary sphincters, as reflected in an increased capillary filtration coefficient. A small increase of regional blood volume was also observed during most vasodilatations. On the basis of these experiments it is impossible to exclude any of the above mentioned mechanisms in a discussion of the cause of the functional hyperemia of the gut. It is proposed that this vasodilatation depends partly on release of intestinal hormones, partly on local mechanisms evoked by mechanical and possibly also by chemical stimulation of the intestinal mucosa.

1102 THE EFFECTS OF E AND A PROSTAGLANDINS ON GASTRIC MUCOSAL BLOOD FLOW AND ACID SECRETION IN THE RAT. *(E.)* Main, I. H. M.; Whittle, B. J. R. (Dept. Pharmacol., Univ. London, England). *Br. J. Pharmacol.* 49(3):428-436, 1973.

The effects of prostaglandins E_1, E_2, A_1 and A_2 on gastric acid secretion and mucosal blood flow were studied by means of a [^{14}C]-aniline clearance technique in anesthetized female rats. During i.v. administration of these prostaglandins, in doses which almost completely inhibited pentagastrin- and histamine-induced acid secretion, a fall in clearance was observed. Clearance/unit acid secretion increased during prostaglandin administration, precluding a primary reduction in mucosal blood flow as the mechanism of the antisecretory action. Prostaglandins increased clearance during basal secretion, indicating a direct vasodilator effect on the gastric mucosa. Endogenous prostaglandins probably contribute to functional vasodilatation in the gastric mucosa. Exogenous prostaglandins, in particular the orally effective, the 15-methyl and 16,16-dimethyl analogues of prostaglandin E_2, may be of clinical value in the treatment of peptic ulcer.

1103 CHARACTERIZATION OF RAT LIVER SUBCELLULAR MEMBRANES. *(E.)* DeHeer, D. H.; Olson, M. S.; Pinckard, R. N. (Univ. Arizona Coll. Med., Tucson). *J. Cell Biol.* 60(2):460-472, 1974.

The effect of acute liver necrosis on the production of autoantibodies to all subcellular membranes and the reaction of these autoantibodies with unique autoantigenic determinants on each membrane was studied in adult Wistar rats. The induction of acute hepatocellular necrosis in rats resulted in the production of complement fixing, IgM autoantibodies directed toward inner and outer mitochondrial membranes, microsomal membrane, lysosomal membrane, nuclear membrane, cytosol, but not to plasma membrane. Utilizing selective absorption procedures it was demonstrated that each subcellular membrane fraction possessed unique autoantigenic activity with little or no cross-reactivity between the various membrane fractions. It is proposed that the development of membrane-specific autoantibodies may provide an immunological marker useful in the differential characterization of various subcellular membranes.

1104 THE EFFECT OF A CHEMICALLY DEFINED DIET ON THE FAECAL FLORA AND FAECAL STEROID CONCENTRATION. *(E.)* Crowther, J. S.; Drasar, B. S.; Goddard, P.; Hill, M. J.; Johnson, K. (St. Mary's Hosp., London, England). *Gut* 14(10):790-793, 1973.

Healthy males (3) consumed a liquid diet containing no fiber and virtually no fat for 10 days. The effect of this diet on the bacterial flora and the steroid composition of the feces was monitored. The change from the normal mixed diet to the liquid one resulted in a marked reduction in weight of feces passed, e.g., in one subject the weight dropped from 278 to 85 g at the end of the 10 day period. Counts of enterococci fell considerably during the 10 days and returned to their former levels on resumption of a normal diet. In 2 subjects the counts of viridans streptococci also fell. The numbers of enterobacteria increased. Counts of all other organisms were unchanged. Acid and neutral steroid concentrations in the feces of all 3 subjects fell to a mean value of 2.0 and 1.9 mg/g dry weight, resp. This was accompanied by a decrease in the degree of degradation of the neutral steroids. During the control period before the diet started, 55-75% of the total neutral steroids were in the form of coprostanol and coprostanone. By the end of the 10 day diet these metabolites accounted for only 4-10% of the total in 2 subjects and for 40% of the third. The percentage of neutral steroids in the form of cholesterol metabolites correlated well with the number of enterococci/g feces. The reduction of cholesterol to coprostanol by pure cultures of intestinal bacteria was assayed. None of the aerobic organisms performed this nuclear hydrogenation. Thus, the neutral steroids of people living on a liquid diet are virtually unmetabolized by the gut bacteria, even though the transit time in these people is remarkably long.

1105 EFFECTS OF AN ELEMENTAL DIET ON HUMAN FECAL FLORA. *(E.)* Bounous, G.; Devroede, G. J. (Gastroenterol. Res. Unit, Univ. Sherbrooke, Canada). *Gastroenterology* 66(2):210-214, 1974.

Fourteen healthy volunteers ate exclusively, for 12 days an elemental diet containing essentially 10 g/100 g of casein hydrolysate (two-thirds free amino acids, one-third oligopeptides), 14 g/100 ml of triglycerides (18% of which was medium chain triglycerides), and 67 g/100 g of disaccharides (one-half in the form of sucrose). The diet produced a decrease in stool frequency: 0.5 stools/24 hr compared with an average of 1.3/24 hr while on normal food. The average weight of stools during the 12 days on diet was 96.2 g, compared with 114.3 g while on normal food. The average counts of total anaerobes, aerobes, and coliforms per gram of diet stool were not significantly different from the corresponding values in control stools. However, there was a significant decrease in the number of enterococci. It is not possible, because of the design of this study, to determine whether the decrease in the number of enterococci is due to the liquid nonresidue, or the elemental character of the diet, or the type of statistical analysis.

1106 ISOLATION OF C4-SYNTHESIZING CELLS FROM GUINEA-PIG LIVER BY FICOLL DENSITY GRADIENT CENTRIFUGATION. *(E.)* Ilgen, C. L.; Burkholder, P. M. (Dept. Pathol., Univ. Wisconsin, Madison). *Immunology* 26(1):197-203, 1974.

Cells which synthesize the fourth component of complement have been isolated from male albino guinea-pig liver through rate zonal density gradient centrifugation of suspensions of liver cells on continuous density gradients (2 to 15%) of Ficoll. This procedure separates non-parenchymal cells from parenchymal cells on the basis of size. Cells which synthesized C4 were identified as low density, non-parenchymal cells which comprised only a small pro-

ortion of the cells added to the gradient. Phago-
ytic cells were restricted to the same portion of
he gradient as cells which synthesized C4, and
here is evidence that cells which synthesize C4
re also phagocytic. Since phagocytic activity was
ccasionally evident in cells observed in the cen-
ers of plaques, the results obtained in this invesi-
igation further support the concept that C4 syn-
hesis in the liver occurs primarily if not ex-
lusively in a reticuloendothelial cell, the Kupffer
ell.

107 PORCINE INTESTINAL CALCIUM-BINDING PROTEIN. MOLECULAR PROPERTIES AND THE EFFECT OF INDING CALCIUM IONS.

(E.) Dorrington, K. J.;
ui, A.; Hofmann, T. (Dept. Biochem., Univ. Toronto,
anada). *J. Biol. Chem.* 249(1):199-204, 1974.

calcium-binding protein from porcine intestinal
ucosa was characterized. Chromatography on
ephadex G-75 suggested a molecular weight around
2,000. Electrophoresis in sodium dodecyl sulfate-
rea-polyacrylamide gel indicated a value in the
rea cf 7000. Sedimentation equilibrium analyses
ave evidence for aggregation, with the monomeric
orm having a molecular weight between 7000 and
00. The amino acid composition, which requires a
nimum molecular weight of 9000, is: Lys_{11-12},
g_1, Asp_7, Thr_1, Ser_{6-7}, Glu_{17}, Gly_4, Ala_5, Val_3,
e_3, Leu_{10}, Tyr_1, Phe_5. No histidine, half-cystine,
thionine, or tryptophan were found. No free term-
al amino group was detected, but digestion with
nicillocarboxypeptidases S1 and S2 indicated the
OH-terminal sequence: ••••(Gly,Thr,Asp)Ala-Ile-
l(Phe,Ser)Leu-Lys-GlnOH. The circular dichroism
ectrum of the binding protein in the near ultra-
olet showed a positive peak at 276 nm with a
oulder at 282 nm characteristic of tyrosine, 2
sitive peaks at 264 nm and 257 nm, and 2 negative
aks at 268 and 261 nm characteristic of phenyl-
anine. In the far ultraviolet range 2 negative
nds at 222 nm and 207 nm were observed. Calcium
n removal decreased the tyrosine band at 276 nm to
ss than 25% its initial value, but caused no
fference in the far ultraviolet range. Ultraviolet
fference spectra between the calcium-containing and
e calcium-free protein showed peaks characteristic
tyrosine. There was no difference in sedimentation
tes. It appeared that the binding of calcium
used a local perturbance of the environment of the
ngle tyrosine residue, but no gross conformational
ange.

08 IMMUNOCHEMICAL STUDIES OF THE INTRAMOLECULAR HETEROGENEITY OF THE CARCINOEMBRYONIC TIGEN (CEA) OF THE HUMAN DIGESTIVE SYSTEM.

(E.)
ld, J. M.; Banjo, C.; Freedman, S. O.; Gold, P.
ontreal Gen. Hosp., Canada). *J. Immunol.* 111(6):
72-1879, 1973.

radioimmunoassay was devised to study the A-like
te on the carcinoembryonic antigen molecule. In
is assay anti-A antibodies were coupled to either
pharose or Sephadex beads. The following observa-
ons were made. The monosaccharide, N-acetyl-D-
lactosamine was capable of inhibiting the interaction between ^{125}I-carcinoembryonic antigen and a preparation of anti-A antibodies. A glycopeptide, (GP-1), containing the tumor-specific antigenic site of the carcinoembryonic antigen, which was obtained by the enzymatic degradation of the carcinoembryonic molecule was capable of binding to anti-A antibodies. The ratio, by weight, of this glycopeptide to N-acetyl-D-galactosamine required to achieve equivalent binding was 10^{-3} to 10^{-4} to 1. The glycopeptide has a molecular weight of about 4000 daltons, and, although it contains N-acetyl-D-glucosamine, D-mannose, D-galactose, and L-frucose, it is apparently devoid of N-acetyl-D-galactosamine. The finding of both the tumor-specific and A-like activities on the glycopeptide suggests that at least some of the carbohydrate chains of the carcinoembryonic molecule may well possess both antigenic specificities. It is suggested that these determinants may reside on a carcinoembryonic megalosaccharide similar to that proposed for the A, B, H, Le, and I blood group substances.

1109 SIMULTANEOUS ESTIMATION OF HEPATIC AND PORTAL BLOOD FLOWS BY AN INDICATOR DILUTION TECHNIQUE.

(E.) Huet, P. M.; Lavoie, P.; Viallet, A. (Hosp. St. Luc., Montreal, Canada). *J. Lab. Clin. Med.* 82(5):836-846, 1973.

Total hepatic and portal blood flows were measured in 19 dogs using indicator dilution curves from hepatic and portal veins after injection of Cr^{51}-labeled red cells into the cranial mesenteric artery. Samples were obtained simultaneously from the left branch of the portal vein and one left hepatic vein (40 experiments), and, when possible, from one right hepatic vein (27 experiments). Portal and hepatic arterial flows were estimated with two electromagnetic flowmeters during each experiment. In 40 experiments, no significant difference was found between total hepatic blood flow, portal blood flow, and portal fraction of total hepatic blood flow (portal blood flow/total hepatic blood flow) estimated simultaneously by flowmeters and indicator dilution curves. In the 27 experiments mentioned above no significant difference existed between paired total hepatic blood flows. Similar results were obtained during 9 experiments in another group of 5 dogs with ligated hepatic artery; no significant difference was found between paired total hepatic blood flow and portal blood flow estimated simultaneously by indicator dilution curves. Such findings validate the sampling from one hepatic vein for total hepatic blood flow estimation and from the left branch of the portal vein for portal blood flow estimation, demonstrating uniform mixing of the indicator in the portal vein and within intrahepatic circulation. Some high absolute flows observed using both methods resulted from the effect of radiopaque material. In 5 additional dogs, radiopaque material (50 ml) increased the cardiac blood flows. These data show the usetulness of the Stewart-Hamilton method for simultaneous estimation of total hepatic blood flow, portal blood flow, and portal fraction of total hepatic blood flow in normal dogs after injections of the indicator into the cranial mesenteric artery. Preliminary data in 11 cirrhotic subjects (9 males and 2 females, aged 36-58 yr) undergoing umbilico-portal and hepatic vein catheterization indicate that the portal fraction of total hepatic blood flow can be estimated by this method, assuming uniform mixing of the indicator in the portal vein. The portal fraction should be reliable, since the portosystemic collaterals resulting in loss of indicator occurred before the sampling sites.

1110 CHEMOTHERAPY AND ANTIBIOTIC-RESISTANCE TRANSFER BETWEEN ENTEROBACTERIA IN THE HUMAN GASTRO-INTESTINAL TRACT. *(E.)* Anderson, J. D.; Gillespie, W. A.; Richmond, M. H. (Dept. Bacteriol., Univ. Bristol, England). *J. Med. Microbiol.* 6(4):461-473, 1973.

Strains of *E. coli* were isolated from the feces of each of 5 healthy subjects (4 males and 1 female, aged 11-60 yr). These strains were genetically marked and fed to the same subject to act as a potential and easily identifiable plasmid recipient and to supplement the endogenous population of *E. coli*. By feeding a different strain of *E. coli*, also genetically marked for identification, and carrying an R factor of known properties, R-factor transfer was investigated. In the absence of antibiotic therapy, no R-factor transfer was detected. However, the R factors concerned could be transferred in laboratory studies from the potential donors to many different enteric organisms as recipients, including the genetically marked potential recipients in these experiments. Treatment of subjects with a relevant antibiotic resulted in the emergence of a number of types of resistant organism, some the potential recipients, and some not, to which transfer had occurred. This change most likely resulted from selection pressure by the antibiotics in favor of the otherwise undetectably small numbers of transcipients normally present in the gut. In 3 of the subjects, antibiotic therapy greatly increased the length of time during which ingested R factors could be detected in the feces. Loss or fragmentation of the genes of the R factors in the ingested organisms that determine antibiotic resistance was deemed unlikely. An incidental finding was that the mean number of antibiotic-resistant determinants in each type of resistant organism rose significantly with the age of the subject. At some point after the removal of selection pressure by cesation of chemotherapy, the gut will contain a mixture of approximately equal numbers of R-factor-carrying resistant strains and R-factor-less potential recipients. At this time, plasmids have the highest probability of transferring to other enterobacteria and much care must be taken in giving a second course of antibiotic therapy within some months of the original treatment.

1111 EXPERIMENTAL INTESTINAL ISCHEMIA SHOCK IN DOGS. *(E.)* Manohar, M.; Tyagi, R. P. S. (Dept. Surg., Haryana A. Univ., Hissar, India). *Am. J. Physiol.* 225(4):887-892, 1973.

Experimental intestinal ischemic shock was studied in 56 healthy adult mongrel dogs under a variety of conditions. Following restoration of blood flow to ischemic bowel after 2 hr of superior mesenteric arterial occlusion, a state of circulatory collapse developed which proved uniformly fatal. Pancreatic duct ligation, 5-6 days prior to conditioning, afforded no protection except that of abolishing tryptic enteritis. The pancreatic duct ligation probably induced tryptic pancreatitis which favored early demise of these animals. The observations on gut-sterilized dogs revealed that endotoxemia had little, if any, role in pathogenesis of the circulatory collapse state. Hypovolemia and high systemic levels of lysosomal hydrolases contributed significantly to the fate of the experimental animal. Dogs treated with immediate fluid therapy alone had prolonged survival time. Supplementing this fluid therapy with hydrocortisone premedication could protect dogs from otherwise lethal shock. The ability of epinephrine-tolerant dogs to survive the otherwise lethal shock without institution of any therapy suggests a vital role for the sympathoadrenal axis in development and progression of the circulatory collapse state after restoration of blood flow to the bowel. A unique feature in these dogs was the occurrence of intessusception of the small bowel anterior to the ileocecal junction. These findings support the view that the hypoxia after restoration of blood flow is important in causing death. Hypoxia resulted from marked hypovolemia and reduced blood flow due to hemoconcentration and elevated total peripheral resistance. This condition was probably induced and maintained by endogenous catecholamines, associated with high levels of lysosomal hydrolases in the systemic circulation, and irreversible depletion of energy-base reserves of the body.

1112 GASTRIC MUCOSAL BLOOD FLOW DURING PENTAGASTRIN- AND HISTAMINE-STIMULATED ACID SECRETION IN THE RAT. *(E.)* Main, I. H. M.; Whittle, B. J. R. (Dept. Pharmacol., Univ. London, England). *Br. J. Pharmacol.* 49(3):534-542, 1973.

Gastric mucosal blood flow was studied during pentagastrin- and histamine-stimulated acid secretion in female rats by means of a (^{14}C)-aniline clearance technique. Measurement of the mucosal blood flow in small animals cannot readily be carried out with aminopyrine since the quantities needed for accurate chemical determination require collection of larger volumes of blood and gastric juice than would be compatible with satisfactory experimental design. Aniline, however, is available as the ^{14}C isotope which allows the estimation of small amounts and is therefore potentially useful for clearance studies in the rat. There was a significant correlation between clearance and stimulated acid secretion. No significant difference was found in the relationship between clearance and acid secretion during submaximal stimulation with either pentagastrin or histamin Estimates of mucosal blood flow per unit acid secretion by (^{14}C)-aniline clearance in the rat were milar to those reported with aminopyrine clearance the dog and cat. To investigate the effect of tal aniline concentration on clearance estimates, e dose was reduced from 170 (μg/kg)/min to 1 (μg/kg)/min. Although the pattern of changes clearance is similar with the lower dose, the solute values are smaller. This implies that not l the extractable (^{14}C)-aniline in the blood is ailable for diffusion into the gastric lumen. It likely that aniline in such low concentrations bound to some constituent of blood in a manner t readily reversible during passage through the cosa. Such a possibility is supported by the exeriments which show that clearance values and the tio of clearance to acid output, when expressed terms of basal values, were not significantly fferent with either dose of aniline. Therefore, earance values obtained with very low quantities aniline do not measure absolutely but do reflect cosal blood flow.

13 TRANSPLANTATION OF CHEMICALLY INDUCED METASTATIC MUCINOUS ADENOCARCINOMAS OF THE JEJUNUM AND COLON IN RATS.

(E.) Ward, J. M.; amamoto, R. S.; Weisburger, J. H.; Benjamin, T. Iatl. Cancer Inst., Bethesda, Md.). *J. Natl. ncer Inst.* 51(6):1997-1999, 1973.

o Fischer rats given s.c. injections of 1,2-dimethylydrazine developed mucinous adenocarcinomas of the lon or jejunum which metastasized to the perioneal and pleural cavities. Portions of metaatic peritoneal tumors were transplanted into eanling rats. The latent periods after i.p. injecon were reduced from 2-3 months in the first passes to 28-35 days by the fifth passages. At necropsy these rats, tumors were found throughout the perioneal and pleural cavities. Subcutaneous transplants ew progressively and metastasized to the lungs. Histoly of transplanted tumors was similar to that of rimary tumors, with some differences. Osteoid metaasia was a feature of the jejunal transplants. though the jejunal tumor lost some of its mucusontaining cells, it still produced much extracellular ucus, which the primary tumor did not do. The colon ansplants were composed of many PAS-positive cells, t did not contain any signet ring cells suspended mucus, as did the primary tumor. Peritoneal metasses of the primary tumors had a prominent stroma, did many of the peritoneal transplants. Pleural mors in transplant rats were usually more cellular an peritoneal and s.c. tumors.

14 EFFECTS OF ACUTE RENAL FAILURE ON ILEAL EPITHELIAL CELL KINETICS: AUTORADIOGRAPHIC UDIES IN THE MOUSE.

(E.) McDermott, F. T.; lbraith, A. J.; Dalton, M. K. (Alfred Hosp., Melurne, Australia). *Gastroenterology* 66(2):235-9, 1974.

fects of acute renal failure on ileal epithelial ll kinetics were investigated by autoradiography th tritiated thymidine in BALB/c mice. Acute nal failure was produced by urinary outflow obruction and controls subjected to sham operation. 18 hr, the labeling index, mitotic index, and percentage of goblet and Paneth cells in the crypt cell population were estimated. The distribution of proliferating cells was obtained by determining the percentage of labeled cells at each cell position in the crypt cell columns. The cell cycle was analyzed by the method of percentage of labeled metaphases. A significant reduction in labeling index was found in the uremic group. The mitotic index, percentage of differentiated cells, and distribution of the proliferative zone were unaltered. In the control group, the deoxyribonucleic acid synthetic phase was 6.6 hr, and the G_2 period, plus prophase and half the metaphase duration, was 1.6 hr. The deoxyribonucleic acid synthetic phase was prolonged to 14.5 hr, and the G_2 period unaltered in the uremic group. It is concluded that acute renal failure causes an inhibition of intestinal epithelial cell proliferation in mice which is associated with prolongation of the deoxyribonucleic acid synthetic phase and the cell cycle.

1115 COMPARISON OF THE VASCULAR ESCAPE PHENOMENON IN THE INTESTINAL AND RENAL CIRCULATION WITH NEURAL AND HUMORAL INDUCTION.

(Ger.) Lutz, J.; Henrich, H. (Phsyiol. Inst., Univ. Wurzburg, Germany). *Pfluegers Arch.* 339(1):37-48, 1973.

The vascular escape phenomenon was investigated in 16 cats anesthetized with chloralose (60 mg/kg) and urethane (260 mg/kg) during simultaneous unilateral or bilateral perfusion of the superior mesenteric and renal arteries. The intestinal circulation was isolated from other circulatory systems by ligating the duodenum and colon. Vasoconstriction was induced either by stimulation of the mesenteric plexus (4-6 Hz, 0.5-1.5 millisec, 2.5-8 volts) or by additiona of norepinephrine (0.33 μg/ml) to the perfusion fluid. During electrical stimulation, escape amounted to 77.8 ± 1.7% in the intestinal circulation and to 81.1 ± 1.7% in the renal circulation, i.e. almost 3/4 of the original constriction disappeared. These 2 values are not significantly different. During norepinephrine-induced constriction, escape amounted to 53.0 ± 2.5% in the intestinal circulation and to only 23.8 ± 1.7% in the renal circulation. The escape phenomenon was observed in the intestinal circulation in 90% (n = 90) and in the renal circulation in only 67.8% (n = 118) of all experiments. These results indicate that escape is significantly more pronounced with neural than with humoral vasoconstriction and that humorally-induced vasoconstriction has a different effect on different organs.

1116 ROLE OF THE GUT MICROFLORA IN METABOLISM OF LIPIDS AND STEROLS.

(E.) Eyssen, H. (Rega Inst., Leuven, Belgium). *Proc. Nutr. Soc.* 32(2):59-63, 1973.

1117 COMPARISON OF THE TISSUE RECEPTORS FOR VIBRIO CHOLERAE AND ESCHERICHIA COLI ENTEROTOXINS BY MEANS OF GANGLIOSIDES AND NATURAL CHOLERA TOXOID. *(E.)* Holmgren, J. (Inst. Med. Microbiol., Univ. Goteborg, Sweden). *Infect. Immun.* 8(6):851-859, 1973.

1118 THE RELATION BETWEEN DIET AND THE GUT MICROFLORA IN MAN. *(E.)* Drasar, B. S.; Crowther, J. S.; Goddard, P.; Hawksworth, G.; Hill, M. J.; Peach, S.; Williams, R. E. O.; Renwick, A. (St. Mary's Hosp. Med. Sch., London, England). *Proc. Nutr. Soc.* 32(2):49-52, 1973.

1119 MEASUREMENT OF HEPATIC BLOOD FLOW IN THE RAT. TRANS-HEPATIC CATHETERIZATION OF THE HEPATIC VEINS. *(Fr.)* Dhumeaux, D.; Berthelot, P. (Henri Mondor Hosp., Creteil, France). *Biol. Gastroenterol. (Paris)* 6(1):49-54, 1973.

1120 CARBOHYDRATE METABOLISM IN THE RUMINANT. BACTERIAL CARBOHYDRATES FORMED IN THE RUMEN AND THEIR CONTRIBUTION TO DIGESTA ENTERING THE DUODENUM. *(E.)* McAllan, A. B.; Smith, R. H. (Natl. Inst. Res. Dairying, Reading, England). *Brit. J. Nutr.* 31(1):77-88, 1974.

1121 HEMODYNAMIC AND METABOLIC ASPECTS OF THE LIVER UNDER CONDITIONS OF SHOCK. (EXPERIMENTAL STUDY). *(It.)* Bellavia, A.; Grassetti, F.; Fianchini, A.; Cagossi, M. (Inst. Surg. Surg. Ther. Clin., Rome, Italy). *Chir. Patol. Sper.* 20(1):1-7, 1972.

1122 PHOSPHORYLASE ISOENZYMES IN TISSUES: PREVALENCE OF THE LIVER TYPE IN MAN. *(E.)* Proux, D.; Dreyfus, J. (Inst. Pathol. Molec. Paris, France). *Clin. Chim. Acta* 48(2):167-172, 1973.

1123 SERUM ALKALINE PHOSPHATASE AFTER FATTY MEALS: THE EFFECT OF SUBSTRATE ON THE ASSAY PROCEDURE. *(E.)* Statland, B. E.; Winkel, P.; Bokelund, H. (Rigshosp., Copenhagen, Denmark). *Clin. Chim. Acta* 49(2):299-300, 1973.

1124 A PHYLOGENETIC STUDY OF THE OCCURRENCE AND DISTRIBUTION OF HISTAMINE IN THE GASTRO-INTESTINAL TRACT AND OTHER TISSUES OF MAN AND VARIOUS ANIMALS. *(E.)* Lorenz, W.; Matejka, E.; Schmal, A.; Seidel, W.; Reimann, H. J.; Uhlig, R.; Mann, G. (Univ. Marburg/Lahn Surg. Clin., Germany). *Comp. Gen. Pharmacol.* 4(15):229-250, 1973.

1125 EFFECT OF PORTAL ARTERIALIZATION ON HEPATIC BLOOD FLOW AND AMMONIA CLEARANCE AFTER END-TO-SIDE PORTACAVAL SHUNT. *(E.)* Lambilliotte, J. P.; Pector, J. C.; Verbeustel, S. (St. Peter's Univ. Hosp., Brussels, Belgium). *Digestion* 9(4):332-342, 1973.

1126 EFFECTS OF SECRETIN ON GUANYL CYCLASE OF VARIOUS TISSUES. *(E.)* Thompson, W. J.; Johnson, D. G.; Lavis, V. R.; Williams, R. H. (Dept. Med., Univ. Washington, Seattle). *Endocrinology* 94(1):276-278, 1974.

1127 SUCCESSFUL ORTHOTOPIC TRANSPLANTATION OF THE CANINE LIVER AFTER PROLONGED PRESERVATION BY INITIAL PERFUSION AND COLD STORAGE. *(E.)* Otte, J. B.; Lambotte, L.; Squifflet, J. P.; Moriau, M.; Kestens, P. J. (Lab. Exp. Surg., Univ. Louvain, Belgium). *Eur. Surg. Res.* 5(4):273-281, 1973.

1128 CONTRIBUTION TO STUDY OF THE ARTERIAL SUPPLY OF THE GASTRO-INTESTINAL TRACT OF THE TOAD (BUFO UFO). *(E.)* Pac, L.; Krahulec, P.; Merta, Z. (Fac. Med. Purkyne Univ., Brno, Czechoslovakia). *Folia Morphol. (Praha)* 21(3):296-298, 1973.

1129 GLUCAGON AS A HYPOCALCEMIC AGENT IN THE RAT. *(E.)* Aliapoulios, M. A.; Morain, W. D.; Kacoyanis, G. P. (Cambridge Hosp., Mass.). *Gastroenterology* 65(6):912-918, 1973.

1130 STUDIES ON HEPATIC UPTAKE OF ANTIGEN. I. COMPARISON OF INTERIOR VENA CAVA AND PORTAL VEIN ROUTES OF IMMUNIZATION. *(E.)* Triger, D. R.; Cynamon, M. H.; Wright, R. (Radcliffe Infirm., Oxford, England). *Immunology* 25(6):941-956, 1973.

1131 CHARACTERIZATION OF THE COLCHICINE BINDING OF MEMBRANE FRACTIONS FROM RAT AND MOUSE LIVER. *(E.)* Stadler, J.; Franke, W. W. (German Cancer Res. Ctr., Heidelberg, Germany). *J. Cell Biol.* 60(1):297-303, 1974.

1132 MEMBRANE POTENTIAL MEASUREMENT IN PAROTID ACINAR CELLS. *(E.)* Pedersen, G. L.; Petersen, O. H. (Inst. Med. Physiol., Univ. Copenhagen, Denmark). *J. Physiol.* 234(1):217-227, 1973.

1133 IDENTIFICATION OF A LOW MOLECULAR WEIGHT ^{65}ZN COMPLEX IN RAT INTESTINE. *(E.)* Hahn, C.; Evans, G. W. (Human Nutr. Lab., USDA., Grand Forks, N.D.). *Proc. Soc. Exp. Biol. Med.* 144(3):793-795, 1973.

1134 LIVER ENZYMES AND OXYGEN SUPPLY DURING PROLONGED EXTRACORPOREAL CIRCULATION WITH STANDARD FLOW RATES. *(E.)* Larmi, T. K. I.; Karkola, P.; Kemppainen, P. (Dept. Surg., Univ. Oulu, Finland). *Scand. J. Thorac. Cardiovasc. Surg.* 7(3):241-248, 1973.

35 FECAL BACTERIAL β-GLUCURONIDASE: CONTROL BY DIET. *(E.)* Reddy, B. S.; Weisburger, H.; Wynder, E. L. (Naylor Dana Inst. Dis. Prention, New York, N.Y.). *Science* 183(4123):416-7, 1974.

36 RADIOLOGICAL AND MORPHOLOGICAL CONDITION OF THE GASTROINTESTINAL TRACT UNDER HIGH TITUDE CONDITIONS. *(Rus.)* Rakhimov, Ia. A.; lkin, V. Sh., Shilimovich, B. A.; Etingen, L. E. o affil.). *Zdravookhr. Tadzhik.* (5):67-69, 1973.

See also, 0971, 0977, 0982.

DIAGNOSTIC PROCEDURES

1137 LIMITS OF THE EVOCATIVE PANCREATIC FUNCTION TEST IN THE DIAGNOSIS OF LOW-GRADE PANCREATITIS. *(E.)* van der Hoeden, R.; Wettendorff, P.; Delcourt, A. (Ixelles Hosp., Belgium). *Gut* 14(10):763-766, 1973.

Limits of the evocative pancreatic function test in the diagnosis of low-grade pancreatitis are discussed with reference to the secretory response of the pancreas and hourly urinary amylase output. Secretin was injected i.v at a dose of 1 U/kg at the same time as caerulein (Farmitalia) at a dose of 40 ng/kg was given. After injection, the biliary-pancreatic secretions were continuously aspirated for 30 minutes. When the gallbladder was emptied, 1 U/kg CCK was injected at the thirtieth minute, to provoke further enzymatic secretion from the pancreas without being affected by biliary secretions. Pancreatic secretions were then continually aspirated for a further 30 minutes. The values obtained for volume, bicarbonate output, and amylase output are markedly greater than those obtained using Boots secretin (1.5 U/kg) and pancreozymin (1.5 U/kg) or caerulein (40 ng/kg). The average of the maximum hourly urinary amylase output increased from 130 before stimulation to 354 after stimulation. By increasing the hormonal stimulation, the urinary amylase output exceeds the admitted upper normal limit when the enzyme output obtained by duodenal aspiration lies above a level of about 180/000 U/hour. This suggests that the evocative pancreatic function test loses its significance when it is carried out in conditions which render it positive in normal subjects. It can no longer differentiate patients suffering from a low-grade pancreatitis from normal subjects.

1138 "MINILAP": AN ACCURATE, RAPID AND SAFE APPROACH TO THE DIAGNOSIS OF LIVER DISEASE AND JAUNDICE. *(E.)* Wexler, M. J.; Mclean, A. P. H.; Skinner, G. B.; Maclean, L. D. (Roy. Victoria Hosp., Montreal, Canada). *Ann. Surg.* 178(6):736-744, 1973.

Minilap, a procedure for an accurate, rapid and safe approach to the diagnosis of liver disease and jaundice is presented. The patient is sedated with Diazepam and taken to the angiography suite of the Radiology Department. Once the umbilical-left portal vein membrane is opened, a black Odman radiopaque catheter with curved guide wire is inserted and manipulated under fluoroscopic control into the main portal system. The guide wire is removed and portal pressure is measured with a saline manometer. The cather is fixed in position with a ligature, and a bolus of 50-75 cc of diatrizoate meglumine is injected at a rate of 10 cc/sec. Serial films are exposed with a Picker-Amplatz rapid film changer set for one film per sec for 10 sec and one every 2 sec for an additional 10 sec. The catheter is then removed and the umbilical vein ligated. A 20 gauge 6 in needle is fully inserted into the right lobe of the liver from the anterior edge directed cranically and posteriorly. It is then slowly withdrawn while injecting contrast medium under fluoroscopic control. A hepatic vein is usually entered in the region of injection, and the immediate washout of dye is observed. If any abnormal displacement or delay in clearance of the dye is encountered, films are taken. The needle is further withdrawn until the bile duct system is entered. A slow injection of 30 cc of Renografin 76 is then made and sequential films exposed in anterior, and lateral projection and on cine. Following cholangiography, direct vision aspiration biopsies are performed using a 1.2 mm Menghini needle in all areas of suspicion. Five representative case histories from the initial 13 patients are presented. Minilap revealed: postnecrotic cirrhosis, severe portal hypertension, esophageal varices, hepatoma, and right hepatic venous obstruction in 1 patient; an absent left lobe, hemachromatosis, and metastic carcinoma in another patient; a tumor in the head of the pancreas in a third patient; chronic active hepatitis with micronodular cirrhosis, histogologicaly far advanced and progressive with active piecemeal necrosis in a fourth patient; and marked reversal of flow in the portal and splenic veins with a large splenorenal shunt and a shrunken liver with features of severe cirrhosis in the fifth patient. It is concluded that this technique is accurate, safe, and can save the patient prolonged hospitalization or needless exploratory laparotomy, with its attendant discomforts.

1139 EFFECTS OF ANTICHOLINERGIC AGENTS ON THE VISUALIZATION OF ESOPHAGEAL VARICES. *(Sp.)* Silvan Delgado, M. (Cantabria Sanit., Santander, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(4):467-474, 1973.

Radiological examinations of the esophagus were performed 30 min after administration of atropine sulfate (0.6 mg i.m.) on 20 patients (13 males and 7 females, mean age 38 yr) with no clinical symptoms of chronic liver disease or portal hypertension and on 26 patients (20 males and 6 females, mean age 45 yr) with clinical symptoms of chronic liver disease and portal hypertension who had no radiological evidence of esophageal varices when examined by conventional methods. Only 5 patients had a history of upper gastrointestinal bleeding. In the controls, esophageal motility and peristalsis decreased, the diameter of the esophagus increased, and gastrointestinal reflux often developed. No signs of esophageal varices were observed. Definitive radiological signs of esophageal varices were observed in 21 of the 26 patients with portal hypertension; in 1 case it was impossible to make a definitive diagnosis and in 4 cases no signs of varices were found. No troublesome complications occurred; the only side effect was xerostomia.

1140 HISTOLOGICAL FINDINGS IN LIVERS OF CLINICALLY NORMAL CARRIERS OF AUSTRALIA ANTIGEN (HB Ag). *(Ger.)* Klinge, O.; Kaboth, U.; Winckler, K. (Pathol. Inst., Univ. Wurzburg, Germany). *Virchows Arch.* [*Pathol. Anat.*] 361(4):359-368, 1973.

Histological examinations were made on 79 punch biopsies from the livers of 58 clinically normal carriers of Australia antigen (HB Ag) (55 men and 3 women, aged 20-30 yr) with normal serum transaminase activities and no history of hepatitis. All

f these subjects remained HB Ag-positive during
he entire follow-up period. The liver parenchyma
as normal or almost normal in 21 cases and showed
vidence of mild portal fibrosis in 2. Changes
haracteristic of cytotoxic liver damage were present
n 41 biopsies: 18 showed hypertrophy of the smooth
nodplasmic reticulum, 19 contained fat deposits
including 1 case of alcoholic cirrhosis), and chol-
stasis was present in 4. Necrosis was present in
biopsies and was associated with mesenchymal and
ortal reactions of varying degrees of severity in
ll but one case. Only 6 biopsies (8.6%) showed
vidence of chronic persistent hepatitis. Follow-up
iopsies, performed on 18 of these HB Ag carriers,
evealed that the lesions became more severe in 4
ases, decreased in severity in 4 cases, and remained
he same in 3. Persistent hepatitis developed in 3
f the 4 subjects with hepatic necrosis who were
ollowed. These findings confirm previous reports
hat most clinically normal HB Ag carriers have asso-
iated liver damage. However, without histological
xamination of the liver there is no justification
or establishing a diagnosis of subclinical hepatitis
olely on the basis of the test for HB Ag.

41 TRANSJUGULAR LIVER BIOPSY AND CHOLANGIO-
GRAPHY. *(E.)* Rosch, J.; Lakin, P.;
ntonovie, R.; Dotter, C. T. (Dept. Diagn. Radiol.,
Jniv. Oregon Med. Sch., Portland). *Fortschr. Geb.
ontgenstr. Nuklearmed.* 119(6):653-661, 1973.

e percutaneous transjugular approach to liver
iopsy and cholangiography eliminating the necessity
or traversing the peritoneal cavity and puncturing
e liver capsule, was used in 61 patients. Both
iopsy and cholangiography were done in 36 patients,
ver biopsy alone in 8 patients, and cholangio-
raphy alone in 17 patients. Diagnostic biopsy
ecimens were obtained in 39 patients (89%). Cholan-
iography succeeded in 29 of 31 patients (93%) with
larged intrahepatic ducts. There were no major
mplications. Advantages and disadvantages of this
proach in comparison to the standard transperi-
neal techniques are discussed. The transjugular
ute offers a feasible, safe and effective approach
r liver biopsy and cholangiography. Safety is its
in advantage over the standard techniques. It is
nsidered complementary to the standard transperi-
neal route for liver biopsy. The transjugular
ute is of particular value in the presence of
agulopathy, high-grade obstructive jaundice, or
jor ascites. For cholangiography, it is considered
primary approach, preferable to the standard trans-
ritoneal technique. Acute cholangitis is the prin-
pal contraindication of this approach.

42 CELL KINETICS IN FLAT (AVILLOUS) MUCOSA
OF THE HUMAN SMALL INTESTINE. *(E.)*
ight, N.; Watson, A.; Morley, A.; Appleton, D.;
rks, J. (Dept. Pathol., Univ. Newcastle upon Tyne,
gland). *Gut* 14(9):701-710, 1973.

new method for the analysis of small-intestinal
ypt-cell kinetics using routine peroral diagnostic
opsies is described. Untreated patients with
ildhood and adult celiac disease and adults with

the gluten-sensitive enteropathy of dermatitis herpetiformis were studied (62 in all), together with groups of 75 adult and 10 childhood controls. In the classical flat avillous mucosae the increase in crypt size was three-dimensional. The number of proliferating cells per crypt was markedly increased, and an even greater rise in the crypt-cell production rate was demonstrated. A significant increase in the mitotic index was also confirmed in the avillous mucosae. It is suggested that the characteristic crypt morphology in gluten-sensitive enteropathy can be explained as an adjustment to accommodate the expanded mass of proliferating and maturing cells necessary to support the augmented cell production rate. This could be a response to a pathologically rapid loss of cells from the mucosal surface.

1143 EXFOLIATIVE CYTOLOGY OF THE BILIARY TRACT WITH THE USE OF SALINE IRRIGATION UNDER CHOLEDOCHOSCOPIC CONTROL. *(E.)* Nishimura, A.; Den, N.; Sato, H.; Takeda, B. (Chiba Univ. Sch. Med., Japan). *Ann. Surg.* 178(5):594-599, 1973.

Cytological examination of the sediment obtained by collecting the irrigation fluid during the fiberoptic choledochoscopy has been performed in 25 cases of biliary tract disease and appears to be a valuable diagnostic measure for tumors in the biliary tract. Exfoliative biliary cytology is emphasized as a routine procedure, accompanying roentgenologic and endoscopic examination. Eighteen of the 25 patients had benign disease including 9 with choledocholithiasis and 8 with cholecysto-choledocholithiasis and 1 with a pancreatic cyst, none showed malignancy except 1 which was classified as Pap. Cl. III. The remaining 7 malignant cases included 1 of carcinoma of the gallbladder, 2 of the choledochus, 3 of the papilla and 1 of submucosal invasion to the choledochal wall originating from carcinoma of the head of the pancreas. These demonstrated to be malignant by exfoliative cytology with the exception of 2 cases; the one was classified as Pap. Cl. II in the case of submucosal invasion, the other as Pap. Cl. III. The latter had carcinoma of the head of the pancreas. The former false negative result was due to the minimal ulceration found on the choledochal wall where the carcinoma had spread chiefly submucosally, the latter may suggest a limitation of the cytological technic. Morphology of malignant cells in the biliary tract is characterized by prominent nucleus, enlargement of nucleus and some nuclear atypia.

1144 THE FALSE-POSITIVE PANCREAS SCAN: DOES IT REFLECT "LOW-NORMAL" PANCREATIC FUNCTION? *(E.)* Agnew, J. E.; Youngs, G. R.; Lydford, R.; Levin, G. E.; Bouchier, I. A. D. (Roy. Free Hosp., London, England). *J. Nucl. Med.* 15(2):90-93, 1974.

The mean trypsin level in 7 normal patients with abnormal pancreas scans was compared with the mean level in 16 normal patients with normal scans. A careful followup of all 23 for at least 1 yr from the time of scanning revealed no radiological or biochemical evidence of pancreatic disease. Six of the 23 patients had laparotomies at which time the pancreas appeared to be normal; 3 of these had carcinoma of the hepatic or bile ducts, 1 had cholelithiasis, 1 had irritable bowel syndrome, and 1 had abdominal pain of unknown cause. Of the 17 patients in whom laparotomy was not performed, 13 had abdominal pain of unknown cause, 2 had stones in the common bile duct, 1 had a gastric ulcer, and 1 had irritable bowel syndrome. Each of 3 observers viewed the 3 scans from each patient and then reported whether he considered the pancreas to be normal or abnormal. Seven patients were judged to have abnormal scans. Five of these had a trypsin level of 42 μM/ml/min or lower while the other 2 had levels of greater than 76 μM/ml/min. Sixteen patients had normal pancreas scans. The trypsin levels in these lay within the range 36-76 μM/ml/min. The difference between the mean trypsin level in the normal scan group and that in the abnormal scan group is not statistically significant. However, the results suggest that some patients with a false-positive pancreatic scan may have duodenal tryptic activities at the lower end of the normal range.

1145 GASTRIC EMPTYING OF LIQUIDS IN MAN. QUANTIFICATION BY DUODENAL RECOVERY MARKER.

(E.) Meeroff, J. C.; Go, V. L. W.; Phillips, S. F. (Mayo Grad. Sch. Med., Rochester, Minnesota). *Mayo Clin. Proc.* 48(10):728-732, 1973.

The duodenal perfusion technique was employed as a means of quantifying gastric emptying in 4 healthy male volunteers, between 22 and 28 yr of age. The arrival in the duodenum of a marker given in a test meal was compared with the amount of marker remaining in the stomach after varying intervals of time. The test meal was an isotonic saline solution containing 100 mg of phenolsulfonphthalein (PSP) per liter. The duodenal perfusate was an isotonic saline solution with 5 g/liter of polyethylene glycol 400 (PEG) as a recovery marker. Total recovery of PSP (the amount recovered from the stomach plus that recovered from the duodenum) was 97.6% of the amount in the meal. There was excellent agreement between the 2 means of assessing gastric emptying (total meal marker minus residual gastric marker and duodenal recovery of gastric marker). In addition, half-times, calculated from gastric recovery and duodenal arrival of the marker, also agreed closely. It is concluded that the duodenal perfusion technique has the following advantages over previous methods: kinetics of gastric emptying can be ascertained from one test meal; the need for gastric aspiration can be obviated; duodenal control of gastric emptying can be studied more directly; and secretion, absorption, and transit can be studied simultaneously.

1146 THE VALUE OF SERUM CATALASE ACTIVITY DETERMINATIONS IN ACUTE PANCREATITIS.

(E.) Meszaros, I.; Goth, L.; Vattay, G. (Munic. Hosp., Sumeg, Hungary). *Am. J. Dig. Dis.* 18(12):1035-1041, 1973.

The values of serum catalase and serum amylase activity determinations in acute pancreatitis are presented. A significant elevation of serum catalase activity was observed in 26 of 28 patients with acute pancreatitis and in 9 of 32 patients with acute cholecystitis. Serum amylase activity in the same groups was significantly elevated in 22 and in 2 cases, respectively. Serum amylase remained elevated for 1 to 3 days, while catalase remained elevated for 10 to 14 days. It is concluded that the measurement of serum catalase activity is complementary to the determination of serum amylase in the diagnosis of acute pancreatitis.

1147 TREHALOSE TOLERANCE TEST. ITS VALUE AS A TEST FOR MALABSORPTION.

(E.) Bergoz, R.; Bolte, J. P.; Meyer zum Bueschenfelde, K.-H. (Cantonal Hosp., Geneva, Switzerland). *Scand. J. Gastroenterol.* 8(7):657-663, 1973.

The value of the trehalose tolerance test as a test for malabsorption is presented. Trehalose is a disaccharide hydrolyzed to glucose by the intestinal brush border enzyme trehalase. A trehalose absorption ratio is defined by the comparison of trehalose and glucose tolerance tests. Normal values (> 0.30) have been established with 50 control patients. The following intestinal disorders were diagnosed in 51 patients: pancreatic steatorrhea (9 cases), idiopathic sprue with dramatic response to gluten-free diet (8 cases), Crohn's disease (14 cases), ulcerative colitis (7 cases), pernicious anemia (4 cases), Whipple's disease (1 case), lymphoma of the small intestine (2 cases), diffuse amyloidosis of the gut (1 case), primary lactase deficiency (5 cases), and bacterial overgrowth in the small intestines (4 patients). An abnormal trehalose absorption ratio (< 0.26) is strongly associated with the presence of malabsorption of intestinal origin. A normalization of this ratio is observed early after treatment of the underlying disease. This test seems to be very sensitive and remains valid when the d-xylose elimination test cannot be used.

1148 SERUM CARCINOEMBRYONIC ANTIGEN IN CLINICAL DISORDERS.

(E.) Booth, S. N.; King, J. P. G.; Leonard, J. C.; Dykes, P. W. (Med. Sch., Univ. Birmingham, England). *Gut* 14(10):794-799, 1973.

Carcinoembryonic antigen (CEA) levels have been measured in the serum of 490 patients and 93 normal controls using the double antibody radioimmunoassay technique. Levels were elevated in 71% of patients with carcinomata of the gastrointestinal tract including tumors of the colon/rectum, stomach, pancreas, and gallbladder, and in 42% with bronchus, breast, cervix/uterus, bladder, and prostate types of malignancy. In patients with non-neoplastic disease of the gastrointestinal tract and liver, elevated levels were found in 14 and 66% respectively. In general the CEA level tends to be higher in cancer patients with hematogenous dissemination. Following complete surgical removal of a tumor, levels fall to normal within 14 days in the majority of patients. Of 33 patients studied during follow up, elevated levels were found in 12, 10 of whom had evidence of recurrence. CEA assay could become a diagnostic tool and could also be of value in the progressive study of patients with pre-malignant or treated malignant conditions.

149 THE SIGNIFICANCE OF AUSTRALIA-ANTIBODY IN BLOOD DONORS: STUDY OF LIVER HISTOLOGY IN DONORS AND POST-TRANSFUSION HEPATITIS IN RECI-PIENTS.

(E.) Reinicke, V.; Poulsen, H.; Banke,).; Dybkjaer, E. (Copenhagen County Hosp., Denmark). *cta Pathol. Microbiol. Scand. (B)* 81(6):753-756, 973.

ystematic screening by immuno-osmophoresis of 7500 onsecutively registered Danish voluntary blood onors revealed 22 with Australia (Au)-antibody. one of these persons had a previous history of epatitis and only 3 had ever received a blood ransfusion. In 21 donors, the antibody persisted uring the entire period of investigation (34-38 onths). Liver biopsies were performed in all 22 onors. No changes such as those seen in viral epatitis or sequelae after viral hepatitis, i.e. ibrosis or cirrhosis, were found in any of the iopsies. Stimulation of Au-antibody production in he present series of donors might have been caused y cellular antigens showing cross-immunity with u-antigen and released by mechanisms other than iral hepatitis. A retrospective study of 12 reci-ients of blood transfusions from the donors with u-antibody revealed no posttransfusion hepatitis, nd in no case could Au-antigen or Au-antibody be emonstrated.

150 DISCRIMINATIVE INTEREST OF THE STUDY OF BASAL ACID SECRETION AND PEPSIN ACID COR-ELATION IN ZOLLINGER-ELLISON SYNDROME AND PEPTIC LCER.

(E.) Bernades, P.; Mignon, M.; Bensalem, .; Dubrasquet, M.; Bader, J. P.; Bonfils, S. Bichat Hosp., Paris, France). *Digestion* 9(1):1-7, 973.

arious criteria based upon study of basal acid and epsin gastric secretion are proposed to facilitate e diagnosis of Zollinger-Ellison (ZE) syndrome ave been analyzed on 599 gastric secretory studies subjects who had undergone no gastric surgery. is population included 20 ZE syndromes and 495 odenal ulcers (DU). Neither an acid concentration 100 mEq/l nor an acid output >15 mEq/h is suf-iciently discriminatory for the diagnosis of ZE ndrome when taken alone because they were found 8.2 and 6% of DU, respectively. However, the sociation of these two criteria in the same cretory study strongly increases the suspicion of is diagnosis because it was found in 60% of ZE ndrome cases and in only 2.8% of DU. A valuable dification of those criteria taken alone is the esence of a basal acid output >18 mEq/h. In the esent series, however, the most interesting criterion s proved to be pepsin/acid correlation (K 25) ual to or lower than 35. In any case, a low pepsin/ id correlation improves the suspicion of the diag-sis. The most characteristic secretory status the ZE syndrome consists of an association of a sal acid output >18mEq/h, a basal acid concen-ation >100 mEq/l and a K 25 <35 which is found 55% of ZE syndrome cases and in only 0.6% of DU without pyloric stenosis. These criteria have to be considered as a means of selection of patients in whom radioimmunoassay of serum gastrin is needed.

1151 ANGIOGRAPHY IN INTESTINAL CARCINOID.

(E.) Bjorn-Hansen, R.; Aakhus, T. (Rikshosp., Oslo, Norway). *Acta Radiol. [Diagn.] (Stockh.)* 14(6):721-728, 1973.

Case reports of 4 patients subjected to angiography for intestinal carcinoid are presented. The first case was a 65-year-old man. Angiography of the superior mesenteric artery disclosed an irregular caliber of the terminal branches of the ileocolic artery in the region of the cecum as well as of the ileal branch supplying the terminal ileum. Accumulation of contrast medium in the tumor was evident in the parenchymal phase. The angiography also revealed metastases in the liver and at operation a neoplasm in the terminal ielum was involving the cecum in accordance with the angiographic findings. Angiography of the superior mesenteric artery of the second case, a 47-yr-old woman, disclosed considerable narrowing of the lower part of this artery as well as of the ileocolic artery. Angiography of the celiac artery revealed expansive lesions in the right hepatic lobe with circumferential displacement of the arteries around them. A marked accumulation of contrast medium appeared in the tumors in the parenchymal phase. Angiography of the superior mesenteric artery of the third case, a 49-year-old female, revealed considerable irregularity of caliber and course of the superior mesenteric and ileocolic arteries distally. Operation revealed a tumor in the ileum one meter proximal to the ileocecal valve and spreading into the mesentery and lymph nodes. Angiography of the superior mesenteric artery of the fourth case, a 58-year-old female, demonstrated markedly irregular narrowing of its lower part. The artery was wide and tortuous and gave off radiating branches. Subsequent urine analysis disclosed an increased level of 5-hydroxyindoleacetic acid.

1152 ^{123}I-IODO-BROMSULPHALEIN AS A LIVER AND BILIARY SCANNING AGENT.

(E.) Goris, M. L. (Donner Lab., Univ. California, Berkeley). *J. Nucl. Med.* 14(11):820-825, 1973.

The way in which ^{123}I-iodo-bromsulphalein (^{123}I-BSP) potentially combines the advantages of ^{131}I-rose bengal (RB) and ^{99m}Tc-labelled colloids in liver function and morphine evaluation is discussed. The labeled tracer, ^{125}I-BSP, was injected i.v. into male Swiss mice weighing between 27 to 34 g. Blood samples were taken over an interval of 15 min. The total amount of BSP and its iodinated derivative, ^{125}I-BSP, injected was approximately 0.2 mg (7 mg/kg). *In vivo* stability was tested by comparing the thyroidal uptake 1 hr after injection, to the thyroidal uptake of Na^{131}I in mice who were kept on an iodine-free diet for 8 days. It was estimated that not more than 1% of the injected activity was free iodide during the course of the experiments. The extraction efficiency was higher for ^{125}I-BSP but so was the extravascular volume. Early, the computed fraction taken up by the liver was larger for BSP. From the mice experiments, it was concluded that a significant improvement over ^{131}I-RB was expected beyond those due to the physical characteristics of ^{125}I. Iodine-^{123}-BSP was injected i.v. in Beagle dogs (10 kg), and the distribution of the tracer followed with an Anger camera. The activity ranged from 0.15 to 1.5 mCi and the total amount of BSP and ^{123}I-BSP from 4 to 40 mg. It is concluded that inasmuch as ^{123}I-BSP behaves in a manner similar to ^{131}I-RB, it will furnish the same type of information otherwise not available from colloidal scanning agents. Since the isotope can be given in higher doses and is compatible with the Anger camera, pictorial information approaching the quality expected of ^{99m}Tc agent can be gained.

1153 SOLITARY ANGIODYSPLASTIC LESIONS IN THE ILEOCAECAL REGION DIAGNOSED BY ANGIOGRAPHY.

(E.) Whitehouse, G. H. (Dept. Radiodiagn., Univ. Liverpool, England). *Gut* 14(12):977-982, 1973.

Single angiodysplasias were demonstrated by preoperative angiography in 4 patients. In 2 cases, the lesions were in the terminal ileum; they were situated just above the cecum in the other 2 cases. In 3 patients, contrast medium was extravasated into the bowel lumen. Histological verification was obtained in 3 instances. In 3 cases, the superior mesenteric artery was selectively catheterized by a green Kifa catheter which was introduced from the femoral artery by the Seldinger technique. In the fourth case, 35 ml Urografin 60% was injected through a straight catheter whose tip was situated in the lumen of the abdominal aorta at the level of the lower part of the twelfth thoracic vertebral body. For the first case, a 65-yr-old male, a right hemicolectomy with removal of the terminal portion of ileum was performed. Histology showed an area of dilated abnormal arterial vessels in the ileum, with an adjacent irregular collagenous mass containing irregularly arranged bundles of smooth muscle and small capillaries, the features being those of an angiodysplasia. For the second case, a 62-yr-old male, a right hemicolectomy with removal of 6 cm of terminal ileum was performed because of the evidence of angiodysplasia found on angiography. The third case, a 37-yr-old male had a segment of ileum corresponding to the angiographic abnormality removed. The fourth patient, a 57-yr-old female underwent a hemicolectomy. There was a blood-filled submucosal space 5 cm distal to the ileocaecal valve, but no site of mucosal ulceration was present. It is concluded that the technique of selective angiography is safe in experienced hands, and the slight morbidity and mortality associated with selective arteriography must be offset against the increased chance of successful localization of the bleeding site at subsequent laparotomy and a shorter operating time.

1154 DISSECTING MICROSCOPY OF THE RECTAL MUCOSA IN HEALTH AND DISEASE. *(E.)*

Bank, S.; Novis, B. H.; Burns, D. G.; Marks, I. N. (Groote Schuur Hosp., Cape Town, South Africa). *Dis. Colon Rectum* 16(6):459-467, 1973.

The dissecting microscope was used to visualize the smaller blood vessels (microvasculature) of the rectal mucosa. Using a direct square-basket Chevalier Jackson biopsy forceps, 157 consecutive rectal biopsies were taken through the sigmoidoscope between 5 and 10 cm from the anal margin. Normal dissecting-microscopy findings were assessed from the biopsy specimens of 26 patients free of colorectal disease or diarrhea. Normal rectal mucosa has a regular honeycomb appearance. Deviations from the normal dissecting-microscopic appearance were assed primarily from 69 biopsy specimens obtained from patients with known ulcerative colitis. The clearly recognizable abnormalities were confined largely to the vascular border of the mucosal units and could be graded according to the severity of the vascular disturbance from 0 (normal) to 4 (destruction of the honeycomb pattern). Sigmoidoscopy disclosed abnormalities ranging from erythema through severe ulceration and bleeding in 60 of the 69 patients with proven ulcerative colitis. Severe sigmoidoscopic changes were associated with loss of architecture or completely disorganized (Grade 3 or 4) dissecting microscopic appearances in the majority of cases. Sigmoidoscopically, moderate colitis was associated with all grades of dissecting-microscopic vascular abnormality, but the latter was often more disturbed than the sigmoidoscopic findings suggested. Four biopsies taken from areas of ulceration with amebic colitis showed dissecting-microscopic changes similar to those found in ulcerative colitis. Of 8 specimens taken from abnormal granular mucosa in 4 patients with rectal Crohn's disease, 5 had normal regular patterns and 3 had only minimal changes. Three biopsy specimens taken from the edge of the carcinoma showed a completely disorganized vascular pattern with vessel formation and large tortuous vessels. Of 6 specimens from patients with mucosal polyps, 5 had normal dissecting-microscopic appearances and one, minimal vessel widening. There was generally good agreement between the vascular arrangements seen on dissecting microscopy and the degree of histologic change in 62 biopsies taken from patients with ulcerative colitis. It is concluded that the dissecting microscope is useful adjunct to sigmoidoscopy and provides some additional insight into mucosal appearances through the sigmoidscope.

1155 A NEW TECHNIQUE FOR EXAMINING INTESTINAL BIOPSIES. *(E.)*

Chapman, B. L.; Henry, K.; Paice, F.; Steward, J. S.; Coghill, N. F. (West Middlesex Hosp., Isleworth, England). *Gut* 14(11):905-909, 1973.

A new technique for examining intestinal biopsies is described. Proximal jejunal biopsies were obtained during the routine investigation of patients suspected of having conditions liable to affect the small intestine, including adult celiac disease and dermatitis herpetiformis. The specimens were fixed in gluteraldehyde buffered with sodium cacodylate. They were subsequently washed with sucrose-cacodylate buffer and then stained with hematoxylin and eosin (H and E), the periodic acid Schiff sequence, and hematoxylin Van Giesen. To measure the total cross-sectional areas occupied by the surface and by the crypt epithelium, a modification of the technique of television image analysis was used. A black-and-white television camera scans the object to be

xamined and converts up to 7 shades of grey into 7
olors which are displayed on a television monitor.
he colors are related to the light intensity at the
espective parts of the object. An analog computer
rocesses the television signals and the results are
isplayed in numerical form. One of the measurements
arried out by the instrument is the total area
ccupied by a given color regardless of its shape,
istribution, or number of parts. The surface cells
nd the crypt cells were put on separate drawings.
he H-and-E-stained sections of each biopsy were
rojected with a standard microprojector. The
pithelium was outlined on paper with a fine felt-
ipped pen. The junctions between surface and crypt
pithelium were arbitrarily taken to be at the bases
f the villi when those were present, and at the
rypt mouths when villi were absent. The television
mage analyser was used to measure the total area
ccupied by the black ink on each drawing. Twelve
ontrol and 12 celiac mucosae were examined. For
he control mucosae, the mean area ratio of the sur-
ace epithelial area to the crypt epithelial area
as 2.27. For the flat celiac mucosae, the mean
rea ratio was only 0.24. It is concluded that this
echnique is of value as a research technique and for
he measurement of minor changes in the mucosa such
s those occurring during treatment of celiac disease
ith a gluten-free diet.

156 THE LUNDH TEST IN THE DIAGNOSIS OF PANCREATIC DISEASE: A REVIEW OF FIVE
EARS' EXPERIENCE. *(E.)* Mottaleb, A.; Kapp, F.;
oguera, E. C. A.; Kellock, T. D.; Wiggins, H. S.;
aller, S. L.(Central Middlesex Hosp., London,
ngland). *Gut* 14(11):835-841, 1973.

n analysis of 523 Lundh tests performed on 492
atients for the diagnosis of pancreatic disease
ver a 5-yr period is presented. Nonpancreatic
atients were those in whom ultimately no evidence
f pancreatic disease was found. Pancreatic disease
as considered to be proven if there was: 1) X-ray
idence of pancreatic calcification, 2) operative
necropsy findings of pancreatic disease, or 3)
the serum amylase was higher than 1100 IU/l dur-
g an attack of pain. There were 235 patients
ith no evidence of exocrine pancreatic disease,
re not diabetic, and had not had gastric surgery:
ese form the control group. Of the 77 patients
ith proven pancreatic disease and biliary tract
rcinoma (including acute and relapsing acute
ncreatitis), 46 (60%) had an abnormal mean tryptic
tivity; if, however, only those patients with
ronic pancreatitis or carcinoma of the pancreas
re considered, the proportion with a mean tryptic
tivity of 6 or less rose to 71%. Eight patients
th biliary tract carcinoma and 14 of 23 patients
th carcinoma of the head of the pancreas presented
th jaundice. Of those with pancreatic carcinoma,
d jaundice, 71% had an abnormal mean tryptic
tivity. Sixty-five per cent of patients with
undice caused by malignant lesions had no bile
the duodenal contents at any time during the
st compared with only 5% of patients with nonmalig-
nt lesions. There were only 6 false positive
sults in 523 tests and 4 were caused by faulty
sitioning of the sampling tube. It is concluded
that the Lundh test is a simple, yet accurate method for diagnosing exocrine pancreatic insufficiency in selected patients.

1157 RAPID SCREENING OF INCREASED BILE ACID DECONJUGATION AND BILE ACID MALABSORPTION BY MEANS OF THE GLYCINE-1-(^{14}C) CHOLYLGLYCINE ASSAY. *(E.)* Pedersen, L.; Arnfred, T.; Thaysen, E. H. (North Aalborg Hosp., Denmark). *Scand. J. Gastroenterol.* 8(7):665-672, 1973.

An evaluation was made of the glycine-1-(^{14}C) cholylglycine assay for rapid screening of increased bile acid deconjugation and bile acid malabsorption in 93 subjects: 19 control patients, 14 patients with various abdominal disorders probably not associated with a disturbed turnover of bile acids (Group 1); 18 patients with ulcerative or regional colitis without preliminary evidence of terminal ileopathy (Group 2); 21 patients exposed to bacterial overgrowth in the proximal gut (Group 3); 9 patients with evidence of terminal ileitis (Group 4); 7 patients with terminal ileal resections of from 40 to 60 cm of the gut; and 5 patients with obscure long-standing watery diarrhea. Fasting patients were fed a 300 ml test meal mixed with 3 g of carmine and containing 10 μCi of glycine-1-^{14}C labeled cholylglycine. The total radiation dose is approximately 125 mrad. Duplicate breath samples (air blown through a glass tube into a counting vial containing 4 ml of trapping solution) were obtained before the test meal and 2, 4, and 6 hr after ingestion. A 24-hr fecal collection was commenced with the first appearance of the carmine in stool. In the control patients, the $^{14}CO_2$ specific activities in breath ranged between 0.01 and 0.09%, whereas the 24-hr stool collections contained from 0 to 7% of the ^{14}C radioactivity administered. One patient from the first group had an abnormal ^{14}C cholylglycine assay. In 17 out of the 18 patients in the second group, the ^{14}C cholylglycine assay was negative. An increased $^{14}CO_2$ specific activity was found in 14 out of 21 patients in the third group. All of the 9 patients in the fourth group had an increased ^{14}C radioactivity in stool, whereas only 5 of them had an abnormal $^{14}CO_2$ specific activity in breath. The fecal ^{14}C radioactivity was increased distinctly in 6 out of 7 patients with resections. Out of 30 patients with chronic diarrhea, 5 had an abnormal ^{14}C cholylglycine assay. It is concluded that the assay is a reliable semiquantitative screening procedure which can be applied on an out patient basis.

1158 SERUM LIPASE ACTIVITY AFTER RETROGRADE TRANSDUODENAL PANCREATOCHOLANGIOGRAPHY. *(Ger.)* Grimmel, K.; Liehr, H.; Kasper, H.; Kulke, H. (Med. Clin. Univ. Wurzburg, Germany). *Dtsch. Med. Wochenschr.* 99(2):43-48, 1974.

Serum lipase activities were measured before, immediately after, and 24 hr after transduodenal pancreatocholangiography in 21 patients. Transient increases in serum lipase activities to more than 200 mU/ml occurred in 10 of 15 patients who underwent retrograde pancreatocholangiography; none of the

10 patients developed clinical symptoms. The increase in serum lipase activity appeared to be correlated with the extent and intensity with which the pancreatic ducts were visualized. The activity of this enzyme increased in only 1 of 4 patients in whom only the pancreatic duct and first-order accessory ducts were visualized, in 7 of 8 in whom second-to fourth-order ducts filled with contrast media, and in all 3 patients in whom the acini were visualized. Two patients developed severe cases of acute pancreatitis: in one serum lipase activities normalized rapidly after glucagon treatment, but the other failed to respond to Trasylol or glucagon and had a pancreatic pseudocyst and pus in a dilated pancreatic duct at laparotomy. Serum α-amylase activities remained normal in 9 of the 10 patients who had elevated serum lipase activities. Pathological increases occurred in 5 of 6 patients with increased serum lipase activities after injection of 100 U secretin. This test may be useful in predicting which patients will develop pancreatitis after pancreatocholangiography.

1159 ^{99m}Tc SODIUM PERTECHNETATE SCANNING OF THE ABDOMEN, A VALUABLE TOOL FOR DETECTION OF MECKEL'S DIVERTICULUM. *(E.)* Geerken, R. G.; Collin, D. B. (Walter Reed Army Med. Ctr., Washington, D.C.). *Med. Ann. D.C.* 42(11):556-557, 1973.

A case report is presented of the use of ^{99m}Tc Sodium Pertechnetate scanning of the abdomen as a valuable tool for detection of Meckel's diverticulum. A 16-year-old boy first noted mild, cramping periumbilical pain followed by passage of bloody stools. Symptoms continued for 3 days with development of weakness and dizziness and he was hospitalized. Diagnostic studies included a normal proctosigmoidoscopy, upper gastrointestinal series with small bowel follow through and barium enema. Three months later, he again noted rectal bleeding. At this time, a liver-spleen scan revealed a central defect consistent with hematoma or cyst. He underwent Gamma-camera scanning of the abdomen 30 min after intravenous injection of 100 μCi/kg of ^{99m} technetium sodium pertechnetate. The scan revealed a focus of activity in the right lower quadrant distinct from the urinary bladder, an appearance similar to previously reported examples of Meckel's diverticulum located by this technique. At laparotomy a 3.5 or 2.0 x 1.5 cm Meckel's diverticulum 90 cm proximal to the ileocecal valve was identified and removed. An incidental apendectomy was performed and the enlarged spleen removed for diagnosis. It contained a 4.5 x 6 cm epidermoid cyst. It is concluded that this relatively simple radioisotope procedure can lead to a correct preoperative diagnosis in a person with recurrent rectal bleeding, and negative proctosigmoidoscopy and barium radiography.

1160 A PATHOGNOMONIC ROENTGENOLOGIC SIGN OF REGIONAL ILEITIS (CROHN'S DISEASE). *(E.)* Welin, S.; Welin, G. (Univ. of Lund, Malmo. Sweden). *Dis. Colon Rectum* 16(6):473-478, 1973.

A roentgenographical analysis of 150 cases of surgically verified regional ileitis involving the colon and of about 200 cases of ulcerative colitis is discussed. A distinction between the 2 syndromes was almost always possible. The swollen mucosal folds with the more or less deep transverse grooves between them are clearly visible on the roentgenographs in regional ileitis. Also required for the diagnosis of regional ileitis are the transverse, narrow, and usually very distinct (though sometimes diffusely outlined) stripes of contrast medium. As a rule, they are more than 1 cm long on the roentgenograms. They are straight, while the rest of the haustra usually appear somewhat curved. The stripes could result from contrast medium situated in the deep grooves between the coarse mucosal folds, which can be seen in the operative specimens, or they may be produced by fiord-like fissures or by ulcerations. No transverse stripes have been found in the 200 surgically verified cases of ulcerative colitis. It is concluded that there is a pathognomonic roentgenologi sign of regional ileitis involving the colon, permitting differential diagnosis of this disease and ulcerative colitis.

1161 ENDOSCOPIC CHOLANGIOGRAPHY FOR BILIARY SYSTEM DIAGNOSIS. *(E.)* Vennes, J. A.; Jacobson, J. R.; Silvis, S. E. (VA Hosp., Minneapolis Minn.). *Ann. Intern. Med.* 80(1):61-64, 1974.

The results of endoscopic cholangiography for biliary system diagnosis were evaluated in 108 patients. In 70 patients, a preliminary diagnosis of extrahepatic biliary obstruction had been made and surgical management was planned. In 38 patients with presumptive primary liver disease, the question of coexisting extrahepatic obstruction could not be answered by clinical study. Endoscopic cholangiography provided necessary diagnostic information for 90 of the 108 patients (83%). Of the 108 patients, 60 proved to have extrahepatic biliary obstruction. In 3 other patients, diagnosis of tumor in the ampullary area was made endoscopically. In 13 patients, the preliminary diagnosis of obstruction of the extrahepatic duct was reversed. The site of ductal obstruction was evident before surgery in 47 patients, and in 42 of these the cholangiographic features led to a correct diagnosis of choledocholithiasis, tumor, or stricture. In 3 additional patients, the diagnosis of periampullary mass was made by cholangiography. Six of the 38 patients with primary liver disease had extrahepatic bile duct obstruction. Complications occurred in 9 patients within 36 hr after visulization of an obstructed common bile duct. Seven patients developed fever with a clinical diagnosis of cholangitis and required emergency surgical decompression. Transient respiratory depression occurred in 1 patient during precannulation sedation. Periampullary dye was observed in 1 patient, but the patient had no postcannulation complications. Asymptomatic hyperamylasuri occurred in more than 33% of the patients. It is concluded that endoscopic cholangiography is of definite clinical and economic benefit in selected patients with biliary tract disease.

1162 NONSURGICAL, PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY-DIAGNOSTIC SIGNIFICANCE IN MEDICAL PROBLEMS OF THE LIVER. *(E.)* Okuda, K.;

anikawa, K.; Emura, T.; Kuratomi, S.; Jinnouchi,
.; Urabe, K.; Sumikoshi, T.; Kanda, Y.; Fukuyama,
.; Musha, H.; Mori, H.; Shimokawa, Y.; Yakushiji,
.; Matsuura, Y. (Chiba Univ. Hosp., Japan). *Am. J.*
g. Dis. 19(1):21-36, 1974.

rcutaneous transhepatic cholangiography was car-
ied out from the right flank on 314 patients with
epatobiliary disease, using a very thin needle.
e procedure was successful in all 95 patients with
lignancies of the liver, bile duct, or pancreas;
104 of 121 patients with gallsontes; in 15 of 18
tients with other surgical diseases (cholecystitis,
enosis of the common duct, internal fistula, and
iopathic choledochus dilation; and in 54 of 80 pa-
ents with nonsurgical hepatobiliary diseases and
to minimal dilation of intrahepatic bile ducts.
the 80 nonsurgical cases, 4 had normal liver; the
hers had intrahepatic cholestasis (20), acute
patitis (11), chronic hepatitis (1), cirrhosis of
e liver (13), post-cholecystectomy syndrome (18),
olangitis (2), clonorchiasis (2), miliary liver ab-
ess (1), hepatobronchial fistula (1), insufficiency
papilla of Vater (1), and Dubin-Johnson syndrome
). The 65% success rate in visualizing intrahepatic
cts in nonsurgical patients was the result of in-
cting contrast medium instead of suctioning bile.
rcutaneous transhepatic cholangiography was of par-
cular diagnostic significance in distinguishing
trahepatic cholestasis from extrahepatic biliary
struction; it also elucidated the cause of biliary
lics and demonstrated intrahepatic stones, malfor-
tions, inflammation along the biliary tract, and
e location and extent of neoplastic invasion. It
metimes provided unexpected information, such as
unusually small bile duct system in the case of
in-Johnson syndrome. The technique may serve the
e purpose as portography and hepatic arteriography
ce these vessel systems run together with the bile
t. Complications were most frequent in patients
h malignancies and included fever, drop in blood
ssure, bile leakage, biliary peritonitis, and
gh. The only complication in the nonsurgical
up was a cough in the patient with hepatobronchial
tula.

3 VALIDITY OF TRANSHEPATIC PULP PRESSURE MEASUREMENTS.

(E.) tenHove, W.; Popovic,
B.; Howard, M. M.; Leevy, C. M. (Coll. Med. Dent.,
Jersey, Newark). *Am. J. Dig. Dis.* 19(1):15-20,
4.

reliability and validity of transhepatic pulp
ssure measurements were studied in 39 patients
h clinical evidence of liver disease, a prothrom-
time within 2 sec of normal control values, and
ormal bleeding and clotting time. Cineangio-
phy was used to document the position of the
dle, and transhepatic pressures were compared
h those obtained by wedging a catheter in the
atic vein or catheterizing the umbilical-portal
n. Transhepatic pressure was measured by a modi-
ation of the Vennes technique with the patient
ng prone. Pressure measurements produced little
comfort or residual pain. Cineangiography in 27
ients revealed 4 patterns: 1) puddling of renogra-
in the area of the tip of the needle with its
rapid dispersion through connecting outflow channels in 13 patients; 2) immediate entry of renografin into a small vascular inflow or outflow conduit without puddle formation in 6 patients; 3) subcapsular extravasation of renografin with its stagnation and persistence under the capsule over a period of observation in 6 patients; and 4) entry of renografin into the biliary system in 2 patients. There was a good correlation between the wedged pressure and transhepatic pressure (r=0.96) and between transhepatic pressure and portal pressure (r=0.99) when puddle formation occurred. Transhepatic pressures were also identical to those obtained when the needle entered an inflow portal venule. When it entered an outflow hepatic venule, or the subcapsular area, the pressures were significantly lower than the pressure existing in the portal vein. Serial studies of alcoholics with active hepatic disease and elevated transhepatic pressures showed a decrease toward normal of the portal pressures with improvement of liver cell morphology. It is concluded that transhepatic pressure measurements are identical to those obtained by hepatic vein or umbilical portal vein catheterization if the needle causes puddle formation or is introduced into a portal venule and a proper external reference point and a nonoccluded needle are used.

1164 A COMPARATIVE STUDY OF FOUR METHODS FOR DETECTING GIARDIA LAMBLIA IN CHILDREN WITH DIARRHEAL DISEASE AND MALABSORPTION.

(E.) Kamath, K. R.; Murugasu, R. (Dept. Pediatr., Univ. of Malaya, Kuala Lumpur, Malaysia). *Gastroenterology* 66(1):16-21, 1974.

Four methods for detecting *Giardia lamblia*, namely examinations of stools, duodenal aspirates, intestinal biopsies, and impression smears of intestinal mucosa, were evaluated prospectively in 21 Malaysian children (aged 11 months to 5 yr) with acute or chronic diarrheal disease or with malabsorption. The parasites were detected by one or more of these methods in 12 patients. Although stool examinations were diagnostic in only 6 patients, duodenal aspirates were positive in 10. All 12 infections would have been detected by combining results of examination of stools and duodenal aspirates. Mucosal impression smears and biopsies gave the highest yield of positive tests; they were diagnostic in all 12 patients in whom parasites were detected by any of the diagnostic methods. Detection of parasites in biopsies was a tedious and time-consuming process, requiring careful scrutiny of several sections before positive identifications could be made. Evaluation of mucosal impression smears for parasites was easier and quicker than examining biopsies. Examination of mucosal impression smears for *G. lamblia* is recommended as a useful initial step in the routine evaluation of intestinal biopsies.

1165 RADIOIMMUNOASSAY, COMPLEMENT FIXATION AND COUNTER-IMMUNOELECTROPHORESIS IN THE LABORATORY DIAGNOSIS OF HEPATITIS B.

(E.) Kouroupis, G. M.; Leers, W. D. (Fac. Med., Univ. Toronto, Canada). *Arch. Gesamte Virusforsch.* 43(1-2):112-118, 1973.

1166 DIAGNOSIS OF ESOPHAGITIS IN SOME DISEASES OF GASTROINTESTINAL TRACT. *(Rus.)* Aminov, A. I. (Tadzhik Ibn-Cina Abu-Ali Med. Inst., Dushanbe, USSR). *Zdravookhr. Tadz.* (5):24-27, 1973.

1167 FIBERGASTROSCOPY WITH TARGET BIOPSY: EXPERIENCE OF 233 EXAMINATIONS WITH THE ACMI INSTRUMENT. *(E.)* Ginestal Da Cruz, A.; Pinto Correla, J.; Batista, A. S. (Univ. Hosp., Lisbon, Portugal). *Arq. Gastroenterol.* 10(2):97-104, 1973.

1168 VALUE OF SERUM GASTRIN IN THE DIAGNOSIS OF THE ZOLLINGER-ELLISON SYNDROME. *(E.)* Hansky, J.; Soveny, C.; Korman, M. G. (Prince Henry's Hosp., Melbourne, Australia). *Aust. N.Z. J. Med.* 3(4):349-354, 1973.

1169 BARIUM FOR DOUBLE CONTRAST EXAMINATIONS. SOME PRACTICAL CONSIDERATIONS. *(E.)* Kalokerinos, J. (no affil.). *Aust. Radiol.* 17(2):155-156, 1973.

1170 ARTERIOGRAPHIC EXAMINATION OF THE SPLEEN AND LIVER. *(E.)* Palmer, F. J.; Sorby, W. A. (Prince Henry Hosp., Sydney, Australia). *Aust. Radiol.* 17(2):182-188, 1973.

1171 PERCUTANEOUS TRANSHEPTAIC CHOLANGIOGRAPHY. *(E.)* Yu, S. F.; Oon, C. L. (Outram Road Gen. Hosp., Singapore). *Aust. Radiol* 17(3): 284-296, 1973.

1172 COMPARISON OF HEPATIC ANGIOGRAPHY WITH RETICULOENDOTHELIAL AND TRANSCATHETER MACRO-AGGREGATED RADIOISOTOPE SCANNING. *(E.)* Andrews, J. T.; Cox, K. R.; Hare, W. S. C. (Royal Melbourne Hosp., Australia). *Aust. Radiol.* 17(3):297-301, 1973.

1173 ANGIOGRAPHY IN GASTRO-INTESTINAL BLEEDING. *(E.)* Sorby, W. A.; Palmer, F. J. (Prince Henry Hosp., Sydney, Australia). *Aust. Radiol.* 17(3):302-307, 1973.

1174 LIPID ISLANDS IN GASTRIC MUCOSA. *(E.)* Heilmann, K. (City Hosp., Pforzheim, Germany). *Beitr. Pathol.* 149(4):411-419, 1973.

1175 VISCERAL EOSINOPHILIC GRANULOMAS. *(E.)* Salfelder, K.; De Liscano, T. R.; De Mendelovici, M. (Inst. Anat. Pathol., Univ. Los Ander, Merida, Venezuela). *Beitr. Pathol.* 149(4):420-428, 1973.

1176 QUANTITATIVE DETERMINATION OF HEPATITIS B ANTIGEN BY MEANS OF RADIAL IMMUNODIFFUSION. *(E.)* Madalinski, K.; Brzosko, W. J.; Budkowska, A.; Mikulska, B. (State Inst. Hygiene, Warsaw, Poland). *Clin. Exp. Immunol.* 15(4):549-556, 1973.

1177 THE APPLICATIONS OF IMMUNOLOGY IN THE DIAGNOSIS OF DIGESTIVE CANCER. *(Fr.)* Sicot, C. (Beaujon Hosp., Clichy, France). *Concours Med.* 95(35-36):4871-4879, 1973.

1178 THE CURRENT STATUS OF ENTEROSCOPY. *(Ger.)* Classen, M.; Demling, L. (Med. Clin., Univ. Erlangen/Nurnberg, Erlangen, Germany). *Dtsch. Med. Wochenschr.* 98(36):1670-1672, 1973.

1179 PANCREATIC DIAGNOSIS WITH THE SONOGRAPHIC TECHNIQUE. *(Ger.)* Rettenmaier, G. (Med. Clin., Univ. Erlangen/Nurnberg, Erlangen, Germany). *Dtsch. Med. Wochenschr.* 98(42):1975-1977, 1973.

1180 ARTERIOGRAPHY IN TRAUMATIC HAEMOBILIA. *(Ger.)* Goerttler, U.; Herfarth, C. (Inst. Radiol. Diagn., Univ. Freiburg, Germany). *Dtsch. Med. Wochenschr.* 98(45):2135-2138, 1973.

1181 DIAGNOSTIC SIGNIFICANCE OF THE SEGMENTAL PERFUSION METHOD, FAT BALANCE AND INDIRECT JEJUNAL FUNCTION TESTS. *(Ger.)* Menge, H.; Gottesburen, H.; Riecken, E. O. (Med. Univ., Marburg/Lahn, Germany). *Dtsch. Med. Wochenschr.* 98(50):2397-2402, 1973.

1182 QUANTITATIVE CHANGES IN IMMUNOGLOBULINS IN CHRONIC LIVER DISEASES. *(Ger.)* Nilius, R.; Zipprich, B. (1st Med. Clin., Univ. Halle (Saale), Germany). *Dtsch. Med. Wochenschr.* 98(50):2424-2425, 1973.

1183 IMMUNOLOGY AND COLONIC CANCER: FURTHER EVALUATION OF THE RADIOIMMUNOASSAY FOR CARCINOEMBRYONIC ANTIGEN OF THE HUMAN DIGESTIVE SYSTEM AS AN ADJUNCT IN CANCER DIAGNOSIS. *(E.)* Gold, P.; Wilson, T.; Romero, R.; Shuster, J.; Freedman, S. O. (Montreal Gen. Hosp., Canada). *Dis. Colon Rectum* 16(5):358-365, 1973.

1184 EVALUATION OF THE LATEX-AGGLUTINATION TEST FOR THE DIAGNOSIS OF INVASIVE AMEBIASIS. *(E.)* Heiblum, M.; Cordero, C. B. (Hosp. Colonia, Mexico City). *Dis. Colon Rectum* 16(5): 368-370, 1973.

1185 ELECTROCARDIOGRAPHIC CHANGES DURING GASTROSCOPY. *(E.)* Pyorala, K.; Salmi, H. J.; Jussila, J.; Heikkila, J. (Dept. Med., Univ. Helsinki, Finland). *Endoscopy* 5(4):186-193, 1973.

1186 GASTROSCOPY IN THE ESTIMATION OF MAXIMAL ACID OUTPUT. *(E.)* Petersen, H.; Myren, J. (Ulleval Univ. Hosp., Oslo, Norway). *Endoscopy* 5(4):194-199, 1973.

187 MORPHOMETRY OF DOG LIVER: COMPARISON OF WEDGE AND NEEDLE BIOPSIES. *(E.)*
ess, F. A.; Gnagi, H. R.; Weibel, E. R.; Preisig,
. (Dept. Anat., Univ. Berne, Switzerland). *Eur.*
. *Clin. Invest.* 3(6):451-458, 1973.

188 PANENDOSCOPY IN THE EARLY DIAGNOSIS OF ACUTE UPPER GASTROINTESTINAL BLEEDING.
E.) Katon, R. M.; Smith, F. W. (VA Hosp., Port-
and, Oregon). *Gastroenterology* 65(5):728-734,
973.

189 HEPATIC FUNCTION TESTS. *(E.)* Burke, M. D. (Univ. Minnesoat Med. Sch., Minnea-
olis). *Geriatrics* 29(1):75-83, 1974.

90 SENSITIVITY OF RADIOIMMUNOASSAY FOR HEPATITIS B ANTIGEN IN DIAGNOSTIC AND
RVEY WORK. *(E.)* Schmidt, N. J.; Forghani, B.;
nnette, E. H. (California Dept. Health, Berkeley).
alth Lab. Sci. 11(1):4-7, 1974.

91 THE LABORATORY IN LIVER DISEASES. *(Sp.)* Andreu Kern, F.; Belda Laguna, O.; Reina
mpos, F. (Virgen del Rocio Munic. Sanit., Sevilla,
ain). *Hispalis Med.* 30(348):517-525, 1973.

92 THE BIOCHEMISTRY OF DIAGNOSING LIVER DISEASE. *(Sp.)* Serrera Contreras, J. L.
irgen del Rocio Munic. Sanit., Sevilla, Spain).
spalis Med. 30(348):533-552, 1973.

93 DETECTION OF GASTRIN IN NORMAL PANCREAS BY RADIOIMMUNOASSAY. *(E.)* Pointner, H.;
cary, J. P.; Vatier, J.; Dubrasquet, M.; Bonfils,
(Hosp. Bichat, Paris, France). *Horm. Metab. Res.*
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4 THE SENSITIVITY OF THE RADIOIMMUNOASSAY FOR DETECTING HEPATITIS ASSOCIATED ANTI-
(HAA). *(It.)* Chezzi, C.; Spagnolo, N.;
tori, G.; Agliano, A. M. (Inst. Microbiol.,
holic Univ. Rome, Italy). *Ig. Mod.* 65(11-12):
-569, 1972.

5 DIAGNOSIS OF EARLY GASTRIC CANCER BY AN ENDOSCOPIC DYEING METHOD. *(E.)* Suzuki,
; Suzuki, H.; Endo, M.; Takemoto, T.; Nakayama,
(Tokyo Women's Med. Coll., Japan). *J. Abdom.*
g. 15(10):199-204, 1973.

6 AN AGGLUTINATION-FLOCCULATION TEST FOR RAPID DETECTION OF HEPATITIS B ANTIGEN.
) Kachani, Z. F.; Gocke, D. J. (Columbia Coll.
sicians Surg., New York, N.Y.). *J. Immunol.*
(5):1564-1570, 1973.

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1198 SUBTYPING OF HEPATITIS B ANTIGEN BY USE OF MONOSPECIFIC ANTIBODY-COATED CELLS. *(E.)* Hollinger, F. B.; Wasi, C.; Dreesman, G. R.; Melnick, J. L. (Baylor Coll. Med., Houston, Tex.). *J. Infect. Dis.* 128(6):753-760, 1973.

1199 DUODENSCOPY AND CATHETERISATION OF THE BILIARY AND PANCREATIC DUCTS. *(Fr.)* Monath, C.; Weill, J. P.; Kempf, E.; Simler, M.; Warter, J. (Med. Clin., Strasbourg, France). *J. Med. Strasbourg* 4(1):1-7, 1973.

1200 COLONOSCOPY. *(Fr.)* Monath, C.; Weill, J. P.; Kerschen, A.; Warter, J. (Clin. Med., Strasbourg, France). *J. Med. Strasbourg* 4(2):111-115, 1973.

1201 ANGIOGRAPHY AND THE GASTROINTESTINAL BLEEDER: A REVIEW. *(E.)* Gammill, S. L. (Univ. Tennessee, Med. Sch., Memphis). *J. Tenn. Med. Assoc.* 67(1):13-15, 1974.

1202 DETERMINATION OF THE pH OF THE GASTRIC CONTENTS WITHOUT A STOMACH TUBE BY USING AN INDICATOR IN CONJUNCTION WITH THE ACIDOTEST. *(Rus.)* Tsimmerman, Ia. S.; Rivkin, V. G. (Perm Med. Inst., USSR). *Lab. Delo* (8):459-462, 1973.

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1204 VALUE OF THE IMMUNOLOGICAL DIAGNOSIS OF TENIASIS. *(Fr.)* Capron, A.; Wattre, P.; Capron, M. (Pasteur Inst., Lille, France). *Lille Med.* 18(5):513-516, 1973.

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1207 ENDOSCOPIC PANCREATOCHOLANGIOGRAPHY. *(E.)* Nagy, G. S. (Roy. North Shore Hosp., Sydney, Australia). *Med. J. Aust.* 2(15):725-729, 1973.

1208 FIBERESOPHAGOSCOPY AND FIBERGASTROSCOPY: TECHNIQUES, COMPLICATIONS, AND DIFFICULTIES. *(Sp.)* de la Revilla, L.; Torres, J. M.; Marti, J.; Martin-Vivaldi, R. (Ruiz de Alda Sanitorium, Granada, Spain). *Medicamenta* 61(511):405-408, 1973.

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1210 NOTES ON A SERIES OF INTESTINAL BIOPSIES IN CHILDREN. *(It.)* Balocco, A.; Ansaldi, N. (2nd Pediatr. Clin., Univ. Turin, Italy). *Minerva Pediatr.* 25(32):1333-1337, 1973.

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1212 PERITONEOSCOPY IN PRIMARY CARCINOMA OF THE LIVER. REPORT OF 50 CASES. *(Fr.)* Debray, C.; Paolaggi, J. A.; Mugnier, B.; Barret, C. (Hosp. Bichat, Paris, France). *Nouv. Presse Med.* 2(40):2659-2662, 1973.

1213 BIOPSY TAKEN DURING FIBERGASTROSCOPIC EXAMINATION AND CYTOLOGICAL STUDIES IN THE DIAGNOSIS OF STOMACH CANCER. *(Pol.)* Nowak, A.; Pasiewicz, J.; Gibinski, K. (Inst. Internal Med., Katowice, Poland). *Pol. Arch. Med. Wewn.* 50(5):459-465, 1973.

1214 POSTOPERATIVE FLOW MANOMETRY OF THE BILIARY TRACT UNDER RADIOLOGICAL CONTROL. *(Sp.)* Rodriguez, J. R.; Castilla, C. E.; Berri, R.; Aguirre, F. M.; Defelitto, J. R.; Menvielle, F. M. (Fac. Med. Sci., Natl. Univ. La Plata, Argentina). *Rev. Esp. Enferm. Apar. Dig.* 41(1):33-52, 1973.

1215 MEASUREMENT OF ESOPHAGEAL pH IN THE DIAGNOSIS OF GASTROESOPHAGEAL REFLUX. *(Sp.)* Tomas Ridocci, M.; Rodrigo Gomez, J. M.: Parrilla Paricio, P.; Aparisi Quereda, L.; Serra Desfilis, M. A.; Guix Garcia, J.; Carbonell Antoli, C.; Garcia-Conde Gomez, F. J. (Fac. Med., Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(4):403-414, 1973.

1216 CLINICAL VALUE OF MEASURING HEPATIC BLOOD FLOW BY RADIOACTIVE COLLOIDAL GOLD (^{198}Au) CLEARANCE IN NORMAL SUBJECTS AND IN PATIENTS WITH VARIOUS LIVER DISEASES. *(Por.)* Laudanna, A. A.; Strauss, E.; da Silva, L. C.; Betarello, A.; Kieffer, J. (Fac. Med., Univ. Sao Paulo, Brazil). *Rev. Hosp. Clin. Fac. Med. Sao Paulo* 28(2):74-79, 1973.

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1218 ESTIMATION OF BENEFITS AND RADIATION RISKS FROM STOMACH MASS X-RAY SURVEY IN JAPAN. *(E.)* Kitabataka, T.; Yokoyama, M.; Sakka, M.; Koga. S. (Niigata Univ. Sch. Med., Japan). *Strahlentherapie* 146(3):352-358, 1973.

1219 ENZYME DIAGNOSIS IN LIVER DISEASE. *(Cz.)* Ninger, E.; Pelikan, V. (Oncol. Inst., KUNZ, Brno, Czechoslovakia). *Vnitr. Lek.* 18(10): 979-988, 1972.

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1221 CLINICAL SIGNIFICANCE OF IMMUNOTHERMISTOGRAPHY IN HEPABILIARY DISEASE. *(Cz.)* Nogaller, A. M.; Levkojeva, L. G.; Karkin, R. M. (I. P. Pavlov Med. Inst., Ryazan, USSR). *Vnitr. Lek.* 18(12):1145-1154, 1972.

1222 ROENTGENOLOGICAL DIAGNOSIS OF EARLY STAGES OF GASTRIC CANCER. *(Rus.)* Barmin, V. S.; Pylitsov, I. M.; (Dolgie Prudy Hosp., Moscow, USSR). *Vopr. Onkol.* 19(8):17-26, 1973.

1223 CYTOLOGICAL DIAGNOSIS OF ESOPHAGEAL CANCER. *(Rus.)* Galaktionov, V. V. (Leningrad Inst. Pediatric Med., USSR). *Vopr. Onkol.* 19(9):104-111, 1973.

1224 THE ROLE OF RHEUMATOID FACTOR AND RELATED HUMAN ANTIGLOBULINS IN THE RADIOIMMUNOASSAY (AUSRIA SYSTEM) FOR THE DETECTION OF HEPATITIS B ANTIGEN. *(E.)* Butler, R.; Brunner, E. (Blood Transfusion Service, Swiss Red Cross, Berne, Switzerland). *Vox Sang.* 25(5):466-469, 1973.

1225 JAUNDICE IN THYROTOXICOSIS AND THE DIFFERENTIAL DIAGNOSIS BETWEEN THIS AND INFECTIOUS HEPATITIS. *(Rus.)* Gorbunova, M. I. (Rupublican Hosp., Kyzyl, USSR). *Vrach. Delo* (8):151-152, 1973.

6 THE FEASIBILITY OF ENDOSCOPY IN THE DIAGNOSIS OF GASTROINTESTINAL DISEASE. *(Rus.)* surov, Kh. Kh. (no affil.). *Zdravookhr. Tadzhikis-a* (5):5-11, 1973.

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1228 RADIOLOGICAL DIAGNOSIS OF THE SMALL AND LARGE INTESTINE AS PART OF SCREENING EXAMINATIONS. *(Ger.)* Nagele, E. (Hosp., Lahr/Schwarzwald, Germany). *Z. Allgemeinmed.* 49(5):202-205, 1973.

See also, 0902, 1235, 1359, 1409, 1415, 1429, 1435, 1558.

GASTROINTESTINAL DISEASES

ESOPHAGUS

1229 THE ABNORMAL LOWER OESOPHAGEAL SPHINCTER IN PERNICIOUS ANAEMIA. *(E.)*

Farrell, R. L.; Nebel, O. T.; McGuire, A. T.; Castell, D. O. (U.S. Naval Hosp., Philadelphia, Pa.). *Gut* 14(10):767-772, 1973.

Lower esophageal sphincter pressure was studied in 9 pernicious anemia patients and 15 controls using an infused open-tipped system. Resting sphincter pressure was significantly ($P < 0.01$) lower in the pernicious anemia patients. After gastric acidification with 0.1 N HCl pressure fell significantly ($P < 0.01$) in both groups. Following subsequent alkalinization, lower esophageal sphincter pressure for controls rose significantly ($P < 0.001$). For pernicious anemia patients the pressure after alkali was not greater than resting levels. Graded intravenous doses of pentagastrin in controls resulted in a peak pressure change of 38.5 ± 4.9 mm Hg after the 0.8 μg/kg dose. For patients the peak pressure change was only 13.0 ± 5.2 mm Hg and occurred after 0.4 μg/kg. Cholinergic stimulation with edrophonium (10 mg) produced a peak pressure change of 20.6 ± 2.6 mm Hg in controls but only 3.5 ± 1.0 mm Hg in pernicious anemia patients ($P < 0.001$). In addition, no change in lower esophageal sphincter pressure occurred in patients after stimulation with subcutaneous betazole (1.5 mg/kg). The lower esophageal sphincter in pernicious anemia is characterized both by a lower resting pressure and decreased response to endogenous and exogenous stimuli. Thes results suggest a primary end organ defect and most likely indicate abnormal smooth muscle function in pernicious anemia. Resting sphincter pressure levels and edrophonium response in age-matched subjects indicate that these changes are not due to aging alone.

1230 CHARACTERISTICS OF LOWER ESOPHAGEAL SPHINCTER FUNCTION IN SYMPTOMATIC DIFFUSE ESOPHAGEAL SPASM. *(E.)*

DiMarino, Jr., A. J.; Cohen, S. (Univ. Pennsylvania Hosp., Philadelphia). *Gastroenterology* 66(1):1-6, 1974.

The characteristics of lower esophageal sphincter function in patients with symptomatic diffuse esophageal spasm were compared with age-matched control subjects. All patients with symptomatic spasm were diagnosed by: (1) a history of substernal chest pain and dysphagis; and (2) characteristic manometric abnormalities in peristalsis. In the patients, lower esophageal sphincter pressure was 28.2 ± 2.5 mm Hg as compared with 19.2 ± 1.3 mm Hg in control subjects. However, the pressure was normal in 18 of the 27 patients. The percentage of decrease in pressure upon swallowing was 96.2 ± 1.8% in control as compared with 80.9 ± 4.8% in all patients with spasms. However, the percentage of lower esophageal sphincter relaxation was normal, 98.4 ± 0.5%, in 17 patients. In the other 10 patients, the percentage of relaxation was 51.3 ± 5.0%. The results of this study suggested that: (1) most patients with symptomatic diffuse esophageal spasm have a normal lower esophageal sphincter pressure and normal relaxation upon swallowing; and (2) a minority of patients with spasm have impaired relaxation with or without an increased pressure.

1231 ALGINATE/ANTACID IN THE REDUCTION OF GASTRO-OESOPHAGEAL REFLUX. *(E.)*

Stanciu C.; Bennett, J. R. (Hull Roy. Infirm., England). *Lancet* (7848):109-111, 1974.

Three randomised groups of 20 patients with gastroesophageal reflux were studied using 15-hr recordings of lower esophageal pH, before and after two weeks' treatment, either with an alginate/antacid compound (Gariscon), antacids alone, or a placebo tablet. Significant reduction in the number of reflux episodes and percentage time during which the lower esophageal pH was acid was noted in the gaviscon group after treatment, whereas no significa changes occurred in the other two groups. Symptoms reported by patients during the second test were fe after gaviscon treatment than after antacid alone. Alginate seems to play the important role, for in th group treated only with the antacid part of gavisco there was no improvement in the results of reflux tests. There was also a reduction in the number of reflux episodes in patients receiving the compound. This suggests that alginate also acts as a physical barrier at the gastro-esophageal junction. The lac of significant improvement of symptoms in this stud may simply reflect the short period between the 2 assessments, and a longer clinical trial, paying attention to symptoms, is required.

1232 METABOLIC DISTURBANCE AFTER GASTRO-OESOPHAGEAL RESECTION. *(E.)*

Markkanen, T. (Dept. Med. Microbiol., Univ. of Turku, Finland) *Int. J. Vitam. Nutr. Res.* 43(4):549-554, 1973.

The transketolase activity of red cells, as an indicator of thiamine nutrition, was studied in 286 control and experimental subjects. The experimenta subjects belonged to the following groups: esophageal resection with esophago-gastric reconstruction proximal gastrectomy with esophago-antrostomy reconstruction, distal partial gastrectomy according to Billroth II, and total gastrectomy with end-to-side esophago-jejunostomy. The operations were performed for carcinoma of the esophagus or for a high gastric carcinoma, and the Billroth II recect for gastric ulcer. About 33% of the operated patie had a red cell transketolase activity lower than th of the controls, and in about 17% this activity was very strongly pathologic. These patients were considered to be affected with thiamine deficiency. The serum contents of copper, zinc, manganese and nickel after partial distal gastrectomy did not differ significantly from the corresponding control values, not even in the patients who had developed sideropenia. It is concluded that, after proximal partial gastrectomy, if transketolase activity fal arly 33% of those patients develop thiamine ficiency of varying degrees.

33 POSTVAGOTOMY DYSPHAGIA. *(E.)* Orlando, R. C.; Bozymski, E. M. (Univ. North Caro- na Sch. Med., Chapel Hill). *Am. J. Surg.* 126(4): 3-687, 1973.

34 PHRENO-OESOPHAGEAL MEMBRANE AND ITS ROLE IN THE DEVELOPMENT OF HIATAL HERNIA. *.)* Eliska, O. (Anat. Inst., Charles Univ., ague, Czechoslovakia). *Acta Anat. (Basel)* (1):137-150, 1973.

35 VARICOID CARCINOMA OF THE ESOPHAGUS. *(E.)* Silver, T. M.; Goldstein, H. M. (Univ. chigan Med. Ctr., Eloise). *Am. J. Dig. Dis.* (1):56-58, 1974.

6 GASTRIC ACID SECRETION IN PATIENTS WITH A SYMPTOMATIC GASTRO-ESOPHAGEAL REFLUX PATIENTS WITH ESOPHAGEAL STRICTURES. *(E.)* ndes, A.; Larrain, A.: Uribe, P. (Dept. Surg., v. Chile, Santiago). *Ann. Surg.* 179(1): -122, 1974.

7 OESOPHAGEAL ATRESIA. 3 CASES IN 2 GENERATIONS. *(E.)* Dennis, N. R.; holas, J. L.; Kovar, I. (Inst. Child Health, don, England). *Arch. Dis. Child.* 48(12): -983, 1973.

8 SOME MEASURES IN PREVENTION AND TREATMENT OF LEAKAGE OF ESOPHAGOGASTRIC ANASTOMOSIS LOWING RESECTION OF CARCINOMA OF THE ESOPHAGUS GASTRIC CARDIA. *(E.)* Anonymous (Cancer Inst., ing, China). *Chinese Med. J.* (11):147, 1973.

9 FALL IN PRESSURE IN THE LOWER ESOPHAGEAL SPHINCTER IN GLUCAGON-INDUCED ACHALASIA. *r.)* Siewert, R.; Fruh, E.; Waldeck, F. (Clin. . Surg., Univ. Gottingen, Germany). *Dtsch. Med. henschr.* 98(43):2045-2046, 1973.

1240 SCLEROSING INJECTIONS OF BLEEDING OESOPHAGEAL VARICES IN INOPERABLE PATIENTS. *(Ger.)* Kapp, F.; Buess, H. J. (Med. Univ. Clin., Basel, Switzerland). *Dtsch. Med. Wochenschr.* 98(52):2465-2469, 1973.

1241 PRECANCEROUS CONDITIONS OF THE ESOPHAGUS AND STOMACH. *(Ger.)* Hafter, E. (no affil.). *Helv. Chir Acta* 40(5/6):593-602, 1973.

1242 RADIOTHERAPY OF CANCER OF THE ESOPHAGUS. *(Jap.)* Kogure, T. (Fac. Med., Univ. Tokyo, Japan). *Jap. J. Cancer Clin.* 19(6):597-598, 1973.

1243 MEGAESOPHAGUS, ESOPHAGITIS, AND MUCOSAL DYSPLASIA. *(Fr.)* Ribet, M.; Mortier, F. (no affil.). *Lille Med.* 18(5):696-697, 1973.

1244 SCHATZKI'S RING: SURGICAL TREATMENT BY THE THAL PROCEDURE. *(Fr.)* Quandalle, P.; Martin, G.; Hilero, G. (no affil.). *Lille Med.* 18(6):698-702, 1973.

1245 THE RECURRENCE OF HIATUS HERNIA. *(It.)* Zilli, L. (Gen. Provincial Hosp., Monfalcone, Italy). *Minerva Med.* 64(81):4307-4311, 1973.

1246 ANATOMICAL AND EMBRYOLOGICAL FEATURES OF THE DIAPHRAGM WITH SPECIAL CONSIDERATION OF THE ESOPHAGEAL HIATUS. *(It.)* Giordano-Lanza, G. (Inst. Normal Human Anat., Univ. Trieste, Italy). *Minerva Med.* 64(81):4256-4262, 1973.

1247 PHYSIOPATHOLOGY OF THE ESOPHAGOGASTRIC JUNCTION. *(Sp.)* Villanueva Edo, A. (Enrique de Sotomayor Munic. Sanit., Bilbao, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(4):475-480, 1973.

See also, 1139, 1166, 1188, 1208, 1209, 1215, 1223.

STOMACH

8 CYTOLOGY IN THE ESTIMATION OF THE SURVIVAL RATE OF PATIENTS WITH GASTRIC CANCER. TEN RS' FOLLOW-UP OF 140 CASES OF MALIGNANCIES. *(E.)* pala, K. (Central Hosp., Vaasa, Finland). *Scand. J. troenterol.* 8(6):529-531, 1973.

influence of cytological findings on the resec- n rate and subsequent survival rate in 140 patients suffering from gastric malignancies was examined in a 10-yr study in Finland. The cytological findings were graded according to Papanicolaou and were suggestive of malignancies in 82.1% of the cases with subsequently confirmed malignancies. After 5 yr, 26.6% of the patients who underwent resection (16/60) were alive; after 10 yr, the survival rate was 20% (12/60). The average 5-yr survival rate for the entire group was 11.4% (16/140); the 10-yr survival rate was 8.6% (12/140). The usefulness of cytological examinations may be demonstrated by the 5-yr survival rates, which increased in relation to the increase in the surgical rate. Thus, the 5-yr survival rate increased in the resected group from 11.8% in 1957 (when 61% of the cytologically examined patients were operated on) to 36.5% in 1959 (when 75% of the examined patients underwent surgery).

1249 DIAGNOSIS OF GASTRIC LYMPHOMA. *(Sp.)*

Velloso Jimenez, A.; de la Santa Lopez, J.; Belda Laguna, O. (Virgen del Rocio Munic. Sanit., Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(3):375-384, 1973.

Of 7 gastric lymphomas diagnosed in a 2-yr period, 2 were limited to the stomach, 2 also involved the intestine, and 3 had become generalized. The patients consisted of 4 women and 3 men, aged 40-70 yr (mean age 58.2 yr). In 4 cases the radiological examination showed diffuse giant folds which, in 1 case, were associated with an ulcer of the greater curvature of the stomach. In the other 3 cases the tumor was localized in the antrum or fundus. Endoscopic examinations of diffuse gastric lymphomas confirmed the radiological findings and revealed the presence of small diffuse ulcers and erosions. Localized lymphomas could not be differentiated from adenocarcinomas by endoscopy. The first biopsy was positive in 5 of these 7 cases. The diagnosis was established from the third biopsy in one case and only from material removed at surgery in another.

1250 PATHOLOGY OF GASTRIC CARCINOMA IN JAPANESE POPULATIONS: COMPARISONS BETWEEN MIYAGI PREFECTURE, JAPAN, AND HAWAII.

(E.) Correa, P.; Sasano, N.; Stemmermann, G. N.; Haenszel, W. (Biometry Branch, NIH, Bethesda, Md.). *J. Natl. Cancer Inst.* 51(5):1449-1459, 1973.

The pathology and related epidemiologic aspects of gastric cancer in Japanese populations of Japan and Hawaii were studied through data and specimens from 407 cases in Miyagi prefecture, Japan, and 256 cases in Hawaii. The estimated incidence rates for diffuse carcinomas were the same in both localities, but the corresponding rates for intestinal, mixed, and other types were substantially lower in Hawaii. The slopes of the incidence curves for intestinal, mixed, and other types were similar in the subgroups considered, but the curves were displaced horizontally to the right (to older ages) in Hawaii as compared to Japan and in females as compared to males. The slope of the incidence curves for diffuse were less steep than for intestinal, mixed, and other types and did not exhibit horizontal displacement. The slopes and displacement of the type-specific incidence curves can be reconciled with the variation in sex ratios by age observed in Japan and Hawaii. An association with blood group A in the Japanese populations studied was limited to diffuse-type tumors. The different age-incidence slopes strengthen the hypothesis that diffuse type is a separate entity from the intestinal, mixed, and other types of gastric carcinoma. The association with blood group A to diffuse carcinomas suggests that the etiology of these tumors may be more closely tied to host-related factors. The consistent slope values for types other than diffuse in Japan and Hawaii suggest that the forces contributing to the rise in incidence with age are similar once some critical age has been reached. Attainment of a certain extension, intensity, or atypia in the metaplastic process may lead into the subsequent induction of gastric carcinoma. This would explain why moving to a lower-risk environment does not suppress the development of gastric carcinoma among migrants from high-risk areas.

1251 CYTOLOGY OF THE GASTRIC MUCOSA IN THE DEVELOPMENT OF CHRONIC GASTRITIS. *(E.)*

Cheli, R.; Carli, C.; Ciancamerla, G. (St. Martino Hosp., Genoa, Italy). *Am. J. Dig. Dis.* 19(2):161-166, 1974.

Gastric cytologic findings were correlated with histopathologic alterations of 131 gastric biopsies from 90 patients in various stages of chronic gastritis. The amount of cellular content in the 42 normal gastric specimens was usually moderate. In the 41 cases of superficial gastritis (inflammatory cell infiltrate limited to area of gastric pits), the gastric specimens usually contained an abundant amount of material. The inflammatory cell infiltrate consisted of neurophile granulocytes, lymphocytes, and rarely of histiocytes. The cytologic findings associated with the 8 cases of interstitial gastritis (interglandular inflammatory cell infiltrate) were similar to those in cases of superficial gastritis. The specimens in the 16 cases of preatrophic gastritis (diffuse inflammatory cell infiltrate throughout major part of the mucosa with reduction in the number of secretory glands and with beginning intestinal metaplasia) contained inflammatory cells (granulocytes, lymphocytes, plasma cells, and rarely histiocytes) and groups of mucous cells and goblet cells. In 5 cases, nuclear alterations were noted in surface mucosal cells. Inflammatory cells, particularly lymphocytes, were numerous, though not consistently present in the 18 cases of atrophic gastritis (extensive inflammatory cell infiltration throughout the entire mucosa with disappearance of gastric secretory glands and consistent presence of intestinal metaplasia). The cells from specimens of the stomach remnant with gastritis (incomplete intestinal metaplasia, 4 cases and complete intestinal metaplasia, 2 cases) usually revealed a variety of changes including those of the nuclear structure which were found in cases of atrophic gastritis. However, the gastric fragments of columnar cells with striated borders and goblet cells which resemble those of the intestine were rarely encountered. The observed cellular changes and their relationship to gastric disorders are probably based on a multitude of factors associated with inflammation, which impair cell maturation by means of hypoxic and abnormal metabolic influences.

In turn, their effect on the cells is probably favored by the resulting transformation of the mucosal structure.

1252 HISTOLOGICAL TYPES OF GASTRIC CANCER AND ITS RELATIONSHIP WITH INTESTINAL METAPLASIA.

(E.) Munoz, N.; Matko, I. (International Agency Res. Cancer, Lyon, France). *Recent Results Cancer Res.* 39:99-105, 1972.

The relationship of intestinal metaplasia to histological types of gastric cancer was studied. The histological sections from surgical specimens or biopsies of gastric cancer were classified into 3 groups: intestinal type, diffuse type, and others. The histological sections were obtained from the departments of pathology of Columbia, Mexico, Poland, and Yugoslavia. The high risk areas include Cali, Colombia; Maribor, Yugoslavia: and Gliwice, Poland. There were 434 total cases from these geographic areas. The percentage of intestinal histological types was 50.5; diffuse, 34.8; and others, 14.7. The ratio of intestinal to diffuse was 1.45. The low risk areas include: Cartagena, Columbia; Barranquilla, Columbia; Mexico City, Mexico; and Koper, Yugoslavia. There was a total of 184 cases: 37% were intestinal, 49.4% were diffuse, and 13.6% were others. The ratio of intestinal to diffuse was 0.75. The intestinal type is most frequent in men and in older age groups; the diffuse type does not show a significant difference by sex, but it is more frequent in the younger ages. Most of the reduction in gastric cancer rates during the last decades can be accounted for by a decrease in the intestinal type. A total of 2,334 blind gastric biopsies taken from 1962 to 1970 and 437 guided biopsies taken from 1966 to 1970 were reviewed for the presence of intestinal metaplasia. Twenty seven cases of gastric cancer were found mong the 376 patients with intestinal metaplasia nd one case among the 293 controls. A higher requency of gastric cancer was found among the guided biopsies. Only 3 of the 27 cases of astric cancer were diagnosed at least 1 yr after he gastric biopsy was taken. The other 24 cases hich occurred among the intestinal metaplasia atients and the one which occurred among the ontrol group, all were diagnosed at the time of he biopsy or a few months after. It is conluded that patients with intestinal metaplasia have higher risk of developing gastric cancer than ge- and sex-matched controls with biopsies negaive for intestinal metaplasia and than the general opulation.

253 MICROFLORA OF SMALL INTESTINE, INCIDENCE OF STEATORRHOEA AND INDICANURIA BEFORE ND AFTER CONVERSION OF BILLROTH II TO BILLROTH I YPE OF GASTRIC RESECTION.

(E.) Engstrom, J.; ellstrom, K.; Lundh, G.; Lonnqvist, B. (Karolnska Inst., Stockholm, Sweden). *Acta Chir. Scand.* 39(6):546-550, 1973.

ll aspirates from the efferent loop of 9 patients 2 females and 7 males, aged 46-68 yr) subjected to a Billroth II gastric resection contained more than 10^5 aerobic colonic and/or common pharyngeal microorganisms/ml. Bacterial cultures from operative specimens from the contents of the efferent loop and the liver showed positive growth in only 3 of 8 and in 1 or 7 patients, resp. After the conversion of the Billroth II to a Billroth I type gastrectomy, the total concentration of bacteria in the upper small intestine was basically unchanged, but pharyngeal species became more prevalent and were recovered from the aspirates of all subjects. When examined 2-25 months after reoperation, 4 of the 9 patients were basically free from postcibal symptoms which had been the reason for the reoperation in all cases. Following the operation, the body weight remained constant in 7 subjects while it increased in one and decreased in another. The fecal fat and urinary indican excretions decreased in 6 of 7 and in 5 of 6 patients, resp. The results of this study indicate that, to some extent, the microflora from the small intestine was related to the type of anastomosis. These results also indicate that microbiological findings in aspirates of the efferent loop do not reflect the bacterial state of the afferent loop and the liver. It appears that the malabsorption in the present Billroth II patients was due only to a small extent to the proliferation of microorganisms in the proximal part of the gastrointestinal tract.

1254 THE IMMUNOLOGICAL QUANTIFICATION OF AN ACID-STABLE CARBOXYL ESTERASE IN THE GASTRIC JUICE OF PATIENTS WITH PERNICIOUS ANEMIA AND CHRONIC ATROPHIC GASTRITIS.

(E.) Rapp, W.; Fisher, J. M.; Taylor, K. B. (Stanford Univ. Sch. Med., Calif.). *Digestion* 9(2):124-129, 1973.

The antigenic acid-stable esterase produced by the surface mucus-secreting cells of gastric mucosa has been quantified in basal and histalog-stimulated fractions of gastric juice from 23 patients and 7 controls, using the single linear immunodiffusion technique. In controls, the mean output of the esterase was 121 mg dry weight/hr during basal secretion which increased during stimulation to 571 mg/hr. In the 23 patients, all with biopsy-proven severe atrophic gastritis and 15 of whom had pernicious anemia, esterase secretion was zero in 20 and negligible in 3. Since the esterase is produced by the epithelial cell layer of the stomach, it is expected to become a new parameter of the morphological and functional integrity of these cells. In patients in whom severe functional and morphological alteration of the surface epithelium has been observed, the esterase secretion should be decreased, as evidenced in this study.

1255 AGE OF GASTRIC CANCER PATIENTS AND SUSCEPTIBILITY TO CHRONIC GASTRITIS IN THEIR RELATIVES. A MATHEMATICAL APPROACH USING POISSON'S PROCESS AND SCORING OF GASTRITIS STATE.

(E.) Kekki, M.; Ihamaki, T.; Varis, K.; Isokoski, M.; Lehtola, J.; Hovinen, E.; Siurala, M. (Dept.

Med., Univ. Helsinki, Finland). *Scand. J. Gastroenterol.* 8(7):673-679, 1973.

The results of morphological examination of the gastric body mucosa of 135 first-degree relatives of 33 index patients with gastric carcinoma and of 142 randomly selected subjects of a Finnish rural population were treated mathematically as follows. Each subject was given a score number depending on the state of gastric body mucosa (normal = 0, superficial gastritis = 1, atrophic gastritis = 2-4). The age specific prevalence curves of the random population were plotted on a scale obtained applying Poisson's process assumptions. An age-dependent score line was then derived from these curves. Individual score numbers for both series were subtracted from this line. Thus an age-adjusted score was obtained. It appeared that first-degree relatives of younger index patients with gastric carcinoma had significantly higher age-adjusted score values than the random population and older index patients. These results clearly suggest the significance of genetic component in the development of gastritis and at least partly suggest a genetically linked association between atrophic gastritis and gastric cancer. It is suggested that there may be 2 types of families with regard to liability to chronic gastritis, high risk and low risk families, the former composed mainly of families in which there are younger gastric cancer patients and the latter composed of families whose gastric cancer patients are older.

1256 ADENOCARCINOMAS OF STOMACH, PANCREAS, LIVER, AND BILIARY TRACTS: SURVIVAL OF 329 PATIENTS TREATED WITH FLUOROPYRIMIDINE THERAPY.

(E.) Davis, Jr., H. L.; Ramirez, G.; Ansfield, F. J. (Univ. Hosp. Madison, Wisc.). *Cancer* 33(1):193-197, 1974.

A series of 328 patients with advanced cancers of the stomach, pancreas, liver, and biliary tract were treated with intensive fluoropyrimidine therapy, including 5-Fluorouracil (5-FU), 5-fluoro-2'-deoxy-β-uridine, intra-arterial infusions of 5-FU, and 5-FU plus radiotherapy. Survival patterns were analyzed with particular emphasis on survival 1 year after treatment was begun. Patients with stomach cancer had median survivals of 5-7 1/2 months; over-all survival of more than a year was seen in 22%. Radiation therapy plus 5-FU was associated with slightly longer survival, as was prior resection of the primary tumor. Patients with pancreatic cancer survived four months median, with 12.5% surviving longer than 1 yr. Survival was dependent on the extent of the disease at the onset of therapy. Hepatobiliary cancer continued to present a very bleak prognosis. However, excellent responses occurred in 3/31 patients with liver cell or bile duct carcinoma. Intra-arterial infusions for liver involvement in these patients appeared to contribute little benefit to over-all survival, although dramatic responses were observed in two patients with primary liver tumors. It would appear that fluoropyrimidine therapy may modestly increase over-all survival in advanced stomach cancer. Survival in pancreatic cancer does not seem to be favorably influenced by this therapy.

1257 FAMILIAL GASTRIC CANCER AND IMMUNOLOGIC ABNORMALITIES.

(E.) Creagan, E. T.; Fraumeni, Jr., J. F. (Natl. Cancer Inst., Bethesda, Md.). *Cancer* 32(6):1325-1331, 1973.

Case reports, laboratory, and environmental studies are presented to study familial gastric cancer and immunologic abnormalities. Stomach cancer developed in 12 members of an inbred Anglo-Saxon family over 4 generations. The family resided in a rural, agricultural county in southwestern Virginia where the reported mortality from this cancer has been significantly higher than in the surrounding region. A high frequency of family members had evidence of cell-mediated immunodeficiency, manifested by impaired lymphocyte transformation *in vitro*, skin test anergy, and lymphocytopenia. The presence in several family members of parietal cell antibodies and macrocytosis suggests a subclinical process related to pernicious anemia, perhaps a genetically-mediated autoimmune gastritis predisposing to stomach cancer. Selective immunoglobulin deficiency was found in only 3 family members of this study, but each had subclinical evidence of gastrointestinal dysfunction: parietal cell antibodies in 2 cases, and a high concentration of alpha-fetoprotein in 1 case. In addition to stomach cancer, the following diseases occurred in 10 other family members: pernicious anemia, carcinoma of colon, systemic lupus erythematosus, adenoma of breast, mucous colitis, adenoma of thyroid and gastric ulcer. An epidemiological analysis revealed that the 35 deaths reported in this county (exclusive of members of the study family) were higher than the 22 expected from the surrounding counties, and the 26 expected from the United States rates. Soil analysis revealed nothing of a significant nature.

1258 ADENYL AND GUANYL CYCLASE IN RABBIT GASTRIC MUCOSA.

(E.) Sung, C. P.; Jenkins, B. C.; Burns, L. R.; Hackney, V.; Spenney, J. G.; Sachs, G.; Wiebelhaus, V. D. (Smith Kilne & French Lab., Philadelphia, Pa.). *Am. J. Physiol.* 225(6):1359-1363, 1973.

Adenyl and guanyl cyclase were studied in rabbit gastric mucosa. The presence of fluoride activates the adenyl cyclase of both fundic and antral mucosa between 5- to 10-fold. The addition of 1 mM histamine to the incubation medium results in a 2- to 5-fold stimulation of adenyl cyclase activity. This stimulation occurs in fundic mucosa, but not antral mucosa. The effect is dose responsive. At very high histamine (10^{-1} M) there is an inhibition showing only 60% of control activity. Studies of adenyl cyclase activity at various pHs revealed an optimum for both basal and histamine stimulated activity at pH 7.8.

variety of analogues of histamine were used o establish a correlation between gastric secreory activity and adenyl cyclase activation. There s a very good correlation bewteen effect in this ssay and effect on gastric acid secretion. Dihenylhydramine, burimamide, and mepyramine inhiited the histamine stimulation of adenyl cyclse activity but diphenylhydramine also blocked luoride stimulation. Mn^{++} inhibited the hisamine stimulation at 5 mM and increased the luoride activation. Guanyl cyclase was not stiulated by either histamine or fluoride. It is oncluded that the histamine-sensitive adenyl cyclse is a property of the tubular cell system and hat there is a distinct correlation between stiulation of the adenyl cyclase and stimulation of cid secretion.

259 MICROFLORA OF THE SMALL INTESTINE AND THE INCIDENCE OF LIVER DISEASE, STEATRRHOEA, AND INDICANURIA IN PATIENTS SUBJECTED TO ARTIAL GASTRECTOMY. *(E.)* Engstrom, J.; ellstrom, K. (Karolinska Inst., Stockholm, weden). *Acta Chir. Scand.* 139(6):539-545, 973.

spirates were obtained from the duodenum of 8 atients subjected to a Billroth I and from the fferent loop of 26 patients subjected to a illroth II gastrectomy. A normal microflora, efined as less than 10^3 of aerobic colonic organisms and less than 10^5 of common pharyngeal pecies/ml aspirate, was encountered in 3 Billroth I patients. Abnormal concentrations of erobic colonic bacteria were found in 3 of the illroth I and 20 of the Billroth II patients, hereas the aspirates from the remaining patents contained more than 10^5 of pharyngeal rganisms/ml. The proliferation of microorganisms in the upper small intestine was not ssociated with ascending cholangitis and liver disease as evidenced by the syptomatology, laboratory ests and the histological picture of the liver iopsy specimens. Neither were these microorgansms a major factor responsible for the malabsorption which often develops after partial gasrectomy. Steatorrhea and abnormal indicanuria ere observed in several patients, but there was o correlation between these findings and the oncentration of microorganisms in the aspirates. lthough deconjugated bile acids were found in nly the most proximal small intestine of a ew patients, the presence of abundant amounts of . *aerogenes* (bile salt-deconjugating organisms) n the aspirates was related to the incidence of teatorrhea.

260 THE EFFECT OF SECRETIN ON PLASMA CONCENTRATION OF GASTRIN IN FASTING PATIENTS WITH CARCINOMA OF THE STOMACH. *(E.)* Schrumpf, E.; Myren, J. (Aker Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 8(6):479-482, 1973.

The basal gastrin level in 10 patients with gastric carcinoma, of whom 4 were achlorhydric and 1 also suffered from pernicious anemia, was not significantly different from that in 6 achlorhydric subjects without carcinoma. A significantly smaller decrease of the basal plasma level of gastrin by secretin did occur, however, in 4 achlorhydric patients with gastric carcinoma than in 6 achlorhydric patients without carcinoma of the stomach. It is therefore questioned whether the gastrin-producing cells in achlorhydric patients with gastric carcinoma are autonomous and thus do not respond to physiological inhibitors like secretin. In 6 patients with gastric carcinoma without achlorhydria, secretin caused a significant decrease in the basal gastrin level, whereas no effect of secretin was seen on the gastrin level in 8 fasting normals. In speculating about the pathogenesis of gastric carcinoma in achlorhydria it is suggested that it may be the gastrin-producing cells, lacking the negative inhibition by the gastric acid secretion, which turn malignant.

1261 UNUSUAL COMPARATIVE FREQUENCY OF GASTRIC CARCINOMA, PERNICIOUS ANEMIA, AND PEPTIC ULCER IN SOUTHWESTERN AMERICAN INDIANS. *(E.)* Sievers, M. L. (Phoenix Indian Med. Ctr., Ariz.). *Gastroenterology* 65(6):867-876, 1973.

A comparison was made of the prevalence of gastric carcinoma, pernicious anemia, gastric ulcer and duodenal ulcer among patients at the Phoenix Indian Medical Center. During 17 yr, 129 patients presented with these 4 diseases. In comparison with rates for the general population, southwestern Indians approximated the expected numbers with gastric carcinoma and pernicious anemia, but had marked deficits for gastric and duodenal ulcer. All with gastric carcinoma, pernicious anemia, or gastric ulcer were Indian, but 26% of the 19 with duodenal ulcer were non-Indian, though the non-Indian admission rate was only 0.5%. Almost 1/3 of the 41 Indians with peptic ulcer had only partial Indian heritage, and 9 of those 13 had duodenal ulcer. Among full-blooded southwestern Indians, 90% of hospital admissions, 60 had gastric carcinoma; 18, pernicious anemia; 22, gastric ulcer; and 3, duodenal ulcer. In contrast with reported Caucasian experience, gastric lesions of Indians were much more likely (2.7:1.0) to be malignant than benign. This probability was highest (8.4:1.0) for the Hohokam (Pima-Papago). Except for a vast predominance of blood group O, southwestern Indians had attributes generally compatible with the observed infrequency of peptic ulcer and moderate prevalence of gastric carcinoma and pernicious anemia: rural reservation residence, lower socioeconomic level, noncompetitiveness, obesity, ABH salivary secretion, phenothiocarbamide taste sensitivity, high rates of diabetes mellitus and cholelithiasis, excessive drinking of alcohol, infrequent smoking of cigarettes, and low rates for chronic obstructure lung disease and coronary heart disease. It is suggested that detailed gastric secretory studies and observation of future disease patterns in southwestern Indians may increase the understanding of these disorders.

1262 SURGICAL RESULTS FOR EARLY GASTRIC CANCER. *(E.)* Yamada, E.; Nakazato, H.; Koike, A.; Suzuki, K.; Kato, K.; Kito, T. (Aichi Cancer Ctr. Hosp., Nagoya, Japan). *Int. Surg.* 59(1): 7-14, 1974.

The results of surgery for early gastric cancer are presented and discussed. A total of 1093 operations for gastric cancer were performed of which 195 were early (cancerous growth of the stomach wall confined to the mucosal or submucosal layer) cases. Gastrectomies were performed on 858 patients of whom 195 were early cancer patients. There were 127 males and 68 females. Early gastric cancers with extremely shallow ulcers were most frequent and were most often found on the lesser curvature with the gastric angle as its center. Intramucosal cancers did not show any lymph node metastases, but 18 submucosal cancers did show them. There were 25 cases with multiple lesions. Fifteen of 195 early gastric cancer cases died after operation; 2 deaths were due to unknown causes, 7 to apparent noncancerous causes, 1 to bile duct cancer, and 5 to apparent recurrence. The recurrent cases were all submucosal cancers, half ulcer type and half tumor type. Three cases showed hematogenous metastases and 3 had liver metastases. Three recurrent cases showed lymph node metastases and 2 did not, but 4 showed lymphatic vessel invasion. It is concluded that the important factors affecting recurrence in early gastric cancer generally are the depth of the cancer invasion, lymph node metastasis, and vascular invasion.

1263 MUCUS GASTRIC BEZOAR. *(E.)* Thompson, H.; Gregory, D. H. (Albuquerque VA Hosp., N.M.). *Gastrointest. Endosc.* 20(2):69-70, 1973.

A case report is presented of a 67-year-old white man with a massive and symptomatic mucus bezoar present in an unobstructed stomach. He appeared at the hospital, complaining of weight loss and early satiety. A barium contrast examination of the upper gastrointestinal tract showed a mass within the stomach which was consistent on all films and diagnosed as a malignant lesion. Fiberoptic gastroscopy was performed. A circumscribed, mucoid-appearing, yellowish-green mass was found adherent to the body of the stomach. The surface of the mass was more solid than the interior. The superficial crust was easily disrupted with rapid dispersement of large amounts of semisolid jelled inner clumps into the gastric lumen. Aspiration of some of this material and sections of the biopsied outer surface showed no evidence of vegetable fibers. The patient was given 0.1 N HCl (120 ml to 180 ml) with 5 crushed Cotazyme tablets a day. Symptoms of early satiety recurred 1 month later at which time a repeated barium contrast examination showed reappearance of the mass. The mass was again disrupted with the biopsy forceps. Oral enzymatic therapy was reinstituted and continued on an intermittent basis.

1264 DISTRIBUTION OF ABO AND RHESUS BLOOD GROUPS IN PATIENTS WITH GASTRIC CARCINOMA, WITH REFERENCE TO ITS SITE OF ORIGIN. *(E.)* Van Wayjen, R. G. A.; Linschoten, H. (Surg. Dept. Wilhelmina Gasthuis, Univ. Amsterdam, Netherlands). *Gastroenterology* 65(6): 877-883, 1973.

The ABO blood group composition of 874 patients with cancer of the stomach was compared with that in 4 control groups--2 groups of blood donors, and 2 of national servicemen. The percentage of blood group A was significantly higher in the patients than in the control groups. This was most pronounced in patients with tumors of the antrum. Rhesus blood group composition between patients and control subjects did not differ. A relation between ABO blood group, secretor status, and excretion of protein and immunoglobulins with the saliva seems to exist. These findings are probably related to correlations between ABO blood group and the serum level of intestinal alkaline phosphatase. High levels of serum concentration were found in persons with blood groups O and B, and low serum concentrations were found in persons with blood group A. A strong relation existed between serum level of intestinal alkaline phosphatase and the secretor status; in nonsecretors a low level was found. It is suggested that genetically determined defects in immune responsiveness associated with certain blood group constellations can increase the susceptibility for diseases, including malignancies. Such a relation is clearly visible in the gastrointestinal tract as can be understood by the specific immunological system of this tract and by the upper intestinal secretion of ABH blood group substances.

1265 ADRENOCORTICAL FUNCTION AFTER MAJOR GASTRIC SURGERY. *(E.)* Blichert Toft, M.; Hansen, O. H.; Holst, J. J.; Nielsen, O. V. (Bispebjerg Hosp., Copenhagen, Denmark). *Am. J. Surg.* 126(4):595-597, 1973.

1266 GASTRIC LEIOMYOBLASTOMA: REPORT OF THREE CASES, ONE MALIGNANT. *(E.)* Abramson, D. J. (Washington Hosp. Ctr., Washington, D.C.). *Ann. Surg.* 178(5):625-630, 1973.

1267 DIFFERENT LOCALIZATION OF GASTRIC CANCER IN MEN AND WOMEN. *(Cz.)* Vesely, K. T.; Kubickova, Z. (Inst. Exp. Med., Prague, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 27(5): 272-274, 1973.

1268 GASTRITIS VARIOLIFORMIS WITH PROTEIN LOSS. *(Ger.)* Filippini, L.; Isliker, K. (Kanton Hosp., Luzerne, Switzerland). *Dtsch. Med. Wochenschr.* 98(41):1892-1894, 1973.

1269 GASTRIC PARIETAL CELL ANTIBODIES IN YOUNG MEN WITH ALCOHOLISM AND WITH NON-

LCER DYSPEPSIA. *(E.)* Roberts, D. M.; Taylor, G. British Military Hosp., Hong Kong). *Digestion* (1):30-35, 1973.

70 VASCULAR CHANGES IN THE GASTRIC FORNIX AFTER PANCREATIC SURGERY. *(Ger.)* irfallah, M.; Goetsch, E. (Knappschafts rnkenhaus, Dortmund, Germany). *Fortschr. Geb. entgenstr. Nuklearmed.* 119(6):761-763, 1973.

71 SARCOID REACTIONS IN CANCER OF THE STOMACH. *(Rus.)* Sidorov, V. S. (no affil.). *Arkh. tol.* 35(2):35-37, 1973.

72 PREVENTION OF ASPIRIN-INDUCED GASTRIC ULCERATION BY BILE DUCT OR PYLORUS GATION IN THE RAT. *(E.)* Djahanguiri, B.: tahi, F. S.; Hemmati, M. (Sch. Med., Univ. hran, Iran). *Gastroenterology* 65(4):630-633, 73.

73 EMERGENCY GASTROSCOPIC POLYPECTOMY FOR CONTROL OF HEMORRHAGE. *(E.)* Brand, B.; rnstein, L. H. (Montefiore Hosp., Bronx, N.Y.). *stroenterology* 65(6):956-958, 1973.

74 THE ENDOSCOPIC APPERAANCE OF ANAPHYLACTOID PURPURA. *(E.)* Akdamar, K.; rawal, N. M.; Varela, P. Y. (Tulane Med. Ctr., w Orleans, La.). *Gastroint. Endosc.* 20(2): -69, 1973.

75 TRICHOBEZOAR, GASTRIC POLYPOSIS, PROTEIN-LOSING GASTROENTEROPATHY AND STEATORRHOEA. *.)* Hossenbocus, A.; Colin-Jones, D. G. (South- pton Gen. Hosp., England). *Gut* 14(9):430-732, 73.

76 DIFFERENTIAL DIAGNOSIS OF TROPHIC GASTRIC ULCERS. *(Sp.)* Meeroff, M.; Meeroff, C. (Metropolitan Sanit., Buenos Aires, Argen- na). *Hispalis Med.* 30(349):601-613, 1973.

77 ENZYME ACTIVITY OF INTESTINAL JUICE IN PATIENTS AFTER CARDIAL RESECTION AND GAS- ECTOMY FOR STOMACH CANCER. *(Rus.)* Nikitin, A.; Barakov, A. G. (All-Union Sci. Res. Inst. in. Exp. Surg., Moscow, USSR). *Kazan. Med.* . (5):12-14, 1973.

8 PYLORIC STENOSIS. A DIFFERENT APPROACH TO MANAGEMENT. *(E.)* Duggan, J. M. y. Newcastle Hosp., Australia). *Med. J. Aust.* 7):811-814, 1973.

9 CURRENT THOUGHTS ON FACTORS THAT INFLUENCE PROGNOSIS OF GASTRIC CANCER. *)* Thomas, E. (Roy. Adelaide Hosp., Australia). *. J. Aust.* 2(17):821-824, 1973.

1280 MALIGNANT DISEASES OF THE STOMACH. ANALYSIS OF 121 PATIENTS. *(E.)* Rahbar, A.; Watne, A. L.; Mendoza, Jr., C. B. (VA Hosp., Clarksburg, W.V.). *Oncology* 28(4):313-318, 1973.

1281 GASTRIC PERFORATION OF RECENT ORIGIN. *(Sp.)* Sans Segarra, M. (Juan XXIII Residence, Tarragona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(2):197-202, 1973.

1282 CANCER OF THE GASTRIC STUMP AFTER GASTRECTOMY FOR ULCER. *(Sp.)* Navajas, M.; Charlo, T. (Virgen del Rocio Munic. Sanit., Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(3):323-330, 1973.

1283 REVIEW OF GASTRIC PHYSIOLOGY. ITS CURRENT STATUS AND PHYSIOPATHOLOGIC CHARACTERISTICS OF THE OPERATED STOMACH. *(Sp.)* Pera Madrazo, C.; Pera Jimenez, C. (Fac. Med., Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(3):331-350, 1973.

1284 GASTRODUODENAL INTUSSUSCEPTION AND GASTRIC POLYPS. *(Sp.)* Barreiro Alvarez, F.; Seco Gil, J. L.; Alverez de la Marina, J. R.; Mateo Martinez, A.; Lopez Lopez, L.; Palazon Hernandez, J. (La Paz Munic. Sanit., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(4):481-496, 1973.

1285 FIBROMUSCULAR ATRESIA OF THE PREPYLORIC ANTRUM. *(Sp.)* Sanjose, G.; Beltran de Heredia, J. M.; Gil Ruiz, J. A.; Valdivieso, J. M.; Maranon, A. (Fac. Med., Vallodolid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(4):497-504, 1973.

1286 GASTROINTESTINAL LIPOMAS: FIVE CASES. *(Fr.)* Klepping, C.; Viard, H.; Ferry, C.; Villand, J. (no affil.). *Rev. Fr. Gastroenterol.* (87):19-32, 1973.

1287 GASTROSTOMY IN PEDIATRIC PATIENTS: AN ANALYSIS OF COMPLICATIONS AND TECHNIQUES. *(E.)* Gallagher, M. W.; Tyson, K. R. T.; Ashcraft, K. W. (Univ. Texas Med. Br., Galveston). *Surgery* 74(536-539, 1973.

1288 PRELIMINARY RESULTS FROM THE USE OF 5-FLUOROURACIL FOR PRESENTING RECURRENCES AND METASTASES AFTER RADICAL SURGERY FOR STOMACH CANCER. *(Rus.)* Blokhina, N. G.; Garin, A. M.; Voznyi, E. K.; Moroz, L. V.; Karev, N. I.; Lichinitser, M. R.; Kuchkarev, R. N.; Sokolov, Iu. N.; Titievskaia, V. V.; Shkarenkov, V. A.; Magamadov, Iu. Kh. (All-Union Chemother. Cancer Control Ctr., Moscow, USSR). *Vestn. Akad. Med. Nauk SSSR* 27(10):29-36, 1972.

1289 CONCERNING A REDUCTION IN INCIDENCE OF THE ADVANCED GASTRIC CANCER. *(Rus.)*

Berzin, S. A. (Provincial Oncol. Dispensary, Sverdlovsk, USSR). *Vop. Onkol.* 19(7):84-88, 1973.

1290 SOME PECULIARITIES OF THE INTESTINAL IRON ABSORPTION IN GASTRIC CANCER. *(Rus.)* Kharatjyan, A. M.; Tsvetkov, V. V.; Makhkamova, M. M.; Khalikov, M. R. (Med. Inst., Tashkent, USSR). *Vopr. Onkol.* 19(8):13-17, 1973.

1291 ON THE CLINICAL COURSE OF GASTRIC POLYPS. *(Rus.)* Mirzaev, A. P.; Azarova, I. V. (Sanitary Hygiene Med. Inst., Leningrad, USSR). *Vopr. Onkol.* 19(8):26-29, 1973.

1292 BASAL METABOLISM AND ITS CORRECTION IN PATIENTS WITH STOMACH CANCER. *(Rus.)* Bazarevich, G. Ia.; Ukhanova, Iu. A. (Kazan Munic. Oncol. Dispensary, USSR). *Vopr. Onkol.* 19(8):99-100, 1973.

1293 THE DNA CONTENT IN THE GASTRIC MUCOSA EPITHELIUM IN CHRONIC GASTRITIS, POLYPOSIS AND CANCER. A COMPARATIVE MICROSPECTROPHOTOMETRIC STUDY. *(Rus.)* Kazantseva, I. A. (USSR Acad. Med. Sci., Moscow). *Vopr. Onkol.* 19(9):51-54, 1973.

1294 CHARACTERISTICS OF BLOOD CATALASE IN PATIENTS WITH CANCER OF THE STOMACH. *(Rus.)* Komov, V. P.; Rakhmanina, T. F.; Drukin, E. Y. (Pharm. Chem. Inst., Leningrad, USSR). *Vop. Onkol.* 19(10):46-50, 1973.

1295 ON NONEPITHELIAL TUMORS OF THE STOMACH. *(Rus.)* Mirzaev, A. P.; Azarova, I. V. (Sanitary Hygiene Med. Inst., Leningrad, USSR). *Vopr. Onkol.* 19(10):92-97, 1973.

See also, 0899, 1145, 1167, 1119, 1174, 1185, 1188, 1195, 1208, 1213, 1218, 1222, 1227, 1231, 1232, 1236, 1238, 1241, 1247, 1296, 1308, 1311, 1582, 1586.

STOMACH

Peptic Ulcers

1296 HEMATOLOGIC ALTERATIONS FOLLOWING PARTIAL GASTRECTOMY. *(E.)* Shafer, R. B.; Ripley, D.; Swaim, W. R.; Mahmud, K.; Doscherholmen, A. (VA Hosp., Minneapolis, Minn.). *Am. J. Med. Sci.* 266(4):240-248, 1973.

Serum and red blood cell (RBC) levels of vitamin B_{12} and folic acid together with serum iron and total iron binding capacity were followed in 142 male patients, aged 25 to 82 yr, after partial gastrectomy. The follow-up period was from two months to 25 yr after surgery. Thirty-three patients had undergone the Billroth I procedure and 109, the Billroth II. Indications for partial gastrectomy included gastric ulcer in 36 patients, duodenal ulcer in 102, and gastric carcinoma in 4. Anemia, defined as a hemoglobin level of less than 13.6 g/100 ml in men, was documented as a complication of partial gastrectomy in 48% of these patients (69 of 142). Iron deficiency, subnormal iron binding saturation, and hypochromic microcytic indices of circulating RBC were present in 32% of the patients (45 of 142). Vitamin B_{12} deficiency occurred in 42% (60 of 142) and folic acid deficiency in 37% (53 of 142 patients). It appears that the anemia resulting from partial gastrectomy represents a complex interrelationship between iron, vitamin B_{12}, and folic acid deficiency. It is evident, however, that a sizable number of patients undergoing partial gastrectomy have no hematological alterations.

1297 BASAL AND STIMULATED Br^{82} INTRAGASTRIC SECRETION IN DUODENAL ULCER. *(E.)* Fodor, O.; Szantay, I.; Cotul, S.; Popescu, S. (3rd Med. Clin., Cluj, Rumania). *Rev. Roum. Biochim.* 10(5):179-184, 1973.

Intragastric secretion of ^{82}Br and the HCl output were investigated in 16 patients with active duodenal ulcers and in 13 controls under basal conditions and after maximal histamine (0.05 mg/kg) or insulin (15 U) stimulation. Basal gastric secretion was collected for 1 hr by continuous aspiration of gastric juice in separate samples taken at 15 min intervals after a single dose of 1 μCi/kg of Na^{82}Br was injected. In both the ulcer and control groups significant increases occurred in the concentrations and outputs of Cl$^-$ after maximal stimulation. ^{82}Br secretion did not vary appreciably and was not correlated with Cl$^-$ secretion. These results suggest differences in gastric secretion of halogens might be related to a selective activity of the gastric parietal cells for chlorine, iodine, and bromine.

1298 RELATIONS BETWEEN THE PEPSIN-ACID CORRELATION (K 25) AND THE GASTRIC SECRETORY ACTIVITY OF URINE FROM 65 PATIENTS WITH DUODENAL ULCERS. *(Fr.)* Bernades, P.; Corbic, M.; Dubrasquet, M.; Bonfils, S. (Bichat Hosp., Paris, France). *Biol. Gastroenterol. (Paris)* 6(3):225-230, 1973.

he pepsin output corresponding to 25 ml of primary
cid secretion (K 25) and gastric secretory activity
f the urine (GSU) were studied in 65 patients (63
en and 2 women, aged 16-72 yr) with duodenal ulcer.
f these patients, 46 had active ulcers (radiological
vidence of an ulcer niche and/or perforation dating
ack less than 15 days) and 19 had quiescent ulcers
history of ulcer and deformation of the duodenal
ulb without an ulcer niche). None of the patients
ad any evidence of Zollinger-Ellison syndrome.
o significant differences between the 2 groups of
atients were found for basal acid output, K 25, or
SU. Basal acid output ranged from 0.67 to 38.55
Eq/hr (mean 9.71 mEq/hr); K 25 values from 17 to 80
mean 44.8); and the test for GSU was negative in 21
ases, weakly positive in 28, and strongly positive
n 16. An inverse relation was found between the K 25
nd basal acid output. Basal acid output was signi-
icantly higher in patients with strongly positive
ests for GSU than in those with negative GSU tests,
hile K 25 values were significantly lower in patients
ith strongly positive GSU tests than in those with
egative and weakly positive tests. No strongly
ositive GSU was associated with a K 25 of more than
0. These findings suggest that hormonal factors
re involved in some cases of duodenal ulcer because
f the similarity between the K 25 and GSU relation
nd those found in Zollinger-Ellison syndrome.

299 STRESS AND ULCERATION IN THE GLANDULAR
AND NONGLANDULAR PORTIONS OF THE RAT'S
TOMACH. *(E.)* Mikhail, A. A. (Dept. Psychology,
. Manitoba, Winnipeg, Canada). *J. Comp. Physiol.*
sychol. 85(3):636-642, 1973.

he mechanisms underlying the formation of lesions
n the rumen and corpus of the rat stomach were
nvestigated in 24 rats of both sexes of the Maudsley
eactive and Nonreactive strains. Ulceration was
nduced in the corpus by partial restraint followed
20 hr of food deprivation (stage 1). Ulcers
isappeared when the rats were allowed to feed and
rink freely in their home cages for 72 hr. Rumenal
esions (stage 2) were produced by subjecting the
ats to conditioned fear (stimulation by light and
hock) for 72 hr (experiment 1) or for 48 hr (ex-
eriment 2). Seven of the 24 rats developed rumenal
esions. None of the sex, strain, or conditioned-
nxiety variables contributed significantly to
e development of lesions. The variable that
ppeared to be closely related to rumenal ulceration
s food deprivation. Rumenal lesions developed in
ne of the 12 rats which were not deprived of food
nd in seven of 12 rats which were deprived. The
echanisms of lesion formation in the glandular and
nglandular portions of the rat stomach are dif-
erent. In experiment 1, the pathophysiological
anges that led to rumenal ulceration were not
ufficient to induce lesions in the glandular re-
on, even when the region was the location of pre-
ous or existing damage. A period longer than 48
following stage 1 was necessary for the forma-
on of rumenal ulcers. The length of the latent
eriod seems to depend on variables which influence
e amount of the animal's food intake and the dura-
on of the deprivation period.

1300 PYLOROPLASTY VERSUS GASTROJEJUNOSTOMY: RESULTS OF A DOUBLE-BLIND, RANDOMIZED, CONTROLLED TRIAL. *(E.)* Kennedy, T.; Johnston, G. W.; Love, A. H. G.; Connell, A. M.; Spencer, F. A. (Roy. Victoria Hosp., Belfast, Northern Ireland). *Br. J. Surg.* 70(12):949-953, 1973.

A double-blind, randomized, controlled trial of 50 cases with Finney pyloroplasty and 50 with gastrojejunostomy, each with selective vagotomy, is reported. There were no operative deaths but 5 patients have subsequently died or have been lost to follow-up, leaving 94 patients, with a mean follow-up time of 3 1/2 yr. There has been 1 proven recurrence after gastrojejunostomy and 2 after pyloroplasty, with 1 further suspected recurrence in each group. The clinical grading marginally favored gastrojejunostomy. There was no significant difference in the incidence of bilious vomiting, dumping, diarrhea, or other disturbances, but there was a significantly greater increase in bowel frequency after pyloroplasty. Weight changes were similar, and there was no gross anemia or calcium deficiency in either group. Gastrojejunostomy is reversible and pyloroplasty is not, and therefore gastrojejunostomy is recommended as the drainage procedure of choice when drainage is necessary after vagotomy.

1301 GRADED VAGOTOMY AND GASTRIC SECRETION. *(E.)* Nundy, S.; Baron, J. H. (Roy. Postgrad. Med. Sch., London, England). *Am. J. Dig. Dis.* 19(2):137-142, 1974.

In 3 female mongrel dogs with gastric fistulae, partial denervation of the acid secreting area of the stomach halved the insulin-stimulated acid secretion. Completion of a highly selective (proximal gastric) vagotomy resulted in a further fall of the peak acid output after insulin to 4% of control values, and there was no further change when selective and truncal vagotomy were performed. The pentagastrin dose-response curve was shifted to the right after partial denervation and remained so shifted after subsequent operations. At low doses there was a considerable decrease in acid output, and the maximal acid output was unchanged but achieved only with a higher dose of pentagastrin. These results suggest that the gastric secretory response after vagotomy is not an all-or-none phenomenon and that the fall in peak acid output after insulin is related to the extent of the acid-secreting mucosa denervated. Tailored vagotomy operations might lower the acid secretion sufficiently to heal an ulcer without interfering with other aspects of gastrointestinal function.

1302 DISORDERS IN PROTEIN AND MINERAL METABOLISM IN PATIENTS WITH PEPTIC ULCER. *(Rus.)* Rybachuk, I. A.; Dovgalenko, V. F.; Fesenko, V. P.; Koval'chuk, P. V. (Vinnitsa Med. Inst., USSR). *Vrach. Delo* (11):39-41, 1973.

1303 VITAMIN METABOLISM IN PATIENTS WITH PEPTIC ULCER AND IN POSTGASTRECTOMY SYNDROME. *(Rus.)* Ivancho, E. S.; Sabov, V. A.; Dolgosh, S. S.; Shchetka, M. P. (Dept. Hosp. Ther., Uzhgorod Univ., USSR). *Vrach. Delo* (11):41-43, 1973.

1304 GASTROINTESTINAL SECRETION OF MUCUS AND PEPTIC ULCERS. *(Fr.)* Andre, C.; Lambert, R. (Edouard Herriot Hosp., Lyon, France). *Ann. Gastroenterol. Hepatol.* 9(1):57-67, 1973.

1305 PHARMACOLOGICAL AND CLINICAL STUDY OF A NEW ANTIULCER AGENT. *(Fr.)* Tournut, J.; Boisson, J. (Veterinary Sch., Toulouse, France). *Ann. Gastroenterol. Hepatol.* 9(1):99-105, 1973.

1306 THE ROLE OF VAGOTOMY WITH GASTRIC DECOMPRESSION IN THE TREATMENT OF PERITONITIS DUE TO PERFORATION OF A DUODENAL ULCER. *(It.)* Barbieri, A. G.; Rossi, W.; Valle, P. (Fatebenefratelli Hosp., Milan, Italy). *Chir. Gastroenterol.* 7(2): 143-147, 1973.

1307 DEGENERATED ANASTOMOTIC PEPTIC ULCERS (AFTER GASTROENTEROSTOMY AND GASTRECTOMY). *(Fr.)* Ribet, M.; Faillon, J. M.; Latreille, J. P.; Houcke, M. (no affil.). *Lille Med.* 18(5):521-522, 1973.

1308 DOUBLE GASTRIC ULCER WHICH UNDERWENT MALIGNANT TRANSFORMATION (KISSING ULCER). GASTRECTOMY. TWELVE-YEAR CURE. *(Fr.)* Verhaeghe, M.; Depadt, G.; Laurent, J. C.; Clay, A. (no affil.). *Lille Med.* 18(6):691-695, 1973.

1309 TREATMENT OF PEPTIC ULCERS. *(Fr.)* Braillon, G.; Boulanger, J. P. (Jules Courmont Hosp., Pierre-Benite, France). *Lyon Chir.* 69(5):331-334, 1973.

1310 GASTRIC ULCER PERFORATION AS A COMPLICATION OF GASTROSCOPY. *(Sp.)* Lopez Sanchez, A.; Herrerias Gutierrez, J. M.; Macias Carmona, A.; Bernaldo de Quiros, J.; Perez Guzman, E.; Montagut Sanchez, M. (Zamacola Residence, Cadiz, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(2):191-196, 1973.

1311 POSTVAGOTOMY FOLLOW-UP: MODIFICATIONS OF THE HOLLANDER TEST. *(Sp.)* Dovale, M.; Santos, R.; Lozano, M.; Vila, R.; Charlo, T. (Virgen del Rocio Munic. Sanit., Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(3):275-284, 1973.

1312 HIGHLY SELECTIVE VAGOTOMY (PROXIMAL SELECTIVE VAGOTOMY WITHOUT DRAINAGE). FIRST ONE HUNDRED CASES. ORIGINAL TEST FOR MONITORING DURING SURGERY. *(Sp.)* Norbona, B.; Chulia, F.; Tome, A.; Lera, F. (Provincial Hosp., Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(4):429-450, 1973.

1313 THE GEOGRAPHICAL DISTRIBUTION AND POSSIBLE FACTORS IN THE AETIOLOGY OF PEPTIC ULCER. *(E.)* Tovey, F. I. (Basingstoke Dist. Hosp., England). *Trop. Doctor* 4(1):17-21, 1974.

1314 SURGERY FOR PEPTIC ULCER. *(E.)* Clark, C. G. (Univ. Coll. Hosp., London, England). *Trop. Doctor* 4(1):31-36, 1974.

1315 DRUG INDUCTOPHORESIS IN COMBINED TREATMENT OF PATIENTS WITH PEPTIC ULCER. *(Rus.)* Grineva, V. I.; Ivankovich, T. K.; Litvin, E. I. (I. I. Mechnikov Dist. Hosp., Dnepropetrovsk, USSR). *Vrach. Delo* (10):11-13, 1973.

1316 ACUTE AFFERENT LOOP SYNDROME. *(Rus.)* Semeniuk, E. Ia. (Kishinev Med. Inst., USSR). *Zdravookhranenie* (6):50-53, 1972.

1317 NONMALIGNANT DISEASES OF THE GASTRIC STUMP AND ADJACENT SEGMENTS. *(Fr.)* Moulinier, B.; Truchot, R.; Berger, G. (Hosp. Edward Herriot, Lyon, France). *Med. Chir. Dig.* 2(1):13-17, 1973.

See also, 1150, 1202, 1205, 1233, 1261, 1282.

SMALL INTESTINE

1318 VASCULAR MALFORMATIONS OF THE INTESTINE: AN IMPORTANT CAUSE OF OBSCURE GASTROINTESTINAL HEMORRHAGE. *(E.)* Heald, R. J.; Ray, J. E. (A. Ochsner Med. Fdn., New Orleans, La.). *South Med. J.* 67(1):33-38, 1974.

Case reports of 5 patients with bleeding vascular malformations of the gastrointestinal tract are presented and discussed. In each case, there was massive, unexplained bleedings. In 4 patients, at least one completely ineffective laparotomy was performed, and in 1 the distral two thirds of the stomach was excised uselessly. In the first case, a purple knob, 1 cm in diameter was discovered on the posterior aspect of the left end of the transverse colon. Local resection of the splenic flexure revealed this small hemangioma which penetrated muscle and submucosa and was clearly ulcerated on its mucosal aspect. Examination of the second patient revealed 3 small capillary hemangiomas on the skin. A blind total colectomy and ileorectal anastomosis were performed. On the mucosa of the lateral wall of the cecum were 2 areas of pigmentation. One was slightly raised and proved to be an adenoma. The other was small, flat and black, only a few millimeters in diameter, and proved to be a hemangioma. The third patient had a laparotomy during which it was found that the jejunum had dilated and there were prominent veings on the surface. The patient was cured by the resection of the worst part of this abnormal small bowel. For the fourth patient, selective celiac angiography was performed and the radiologist reported a small area of abnormal circulation and a small extravascular stain of contrast in the lower esophagus. A small circular disk of esophageal wall was resected and revealed a small vascular hamartoma. The fifth patient had a superior mesenteric arteriogram which revealed an arteriovenous malformation in the region of the cecum. Right hemicolectomy was successful in stopping the bleeding. The small size and vascular nature of these lesions make the diagnosis by routine roetgenographic studies difficult. Selective mesenteric angiography is probably the best diagnostic aid. When such a lesion is suspected and all radiographic studies are negative, blind right colectomy is more apt to cure the patient than any other procedure.

1319 ENDOMETRIOSIS OF THE SMALL INTESTINE. PRODUCING INTESTINAL OBSTRUCTION OR SIMULATING NEOPLASM. *(E.)*

LiVolsi, V. A.; Perzin, K. H. (Columbia Univ. Coll. Physicians Surgeons., New York, N.Y.). *Am. J. Dig. Dis.* 19(2):100-108, 1974.

Five cases of endometriosis of the small intestine are presented in which the diagnosis of small intestinal neoplasm was strongly considered clinically. The patients ranged in age from 25 to 48 yr. They were pre- or perimenopausal. Three patients were nulliparous at the time of diagnosis; a fourth woman had 1 child and 1 abortion. The fifth individual gave a history of 2 successful pregnancies and 1 abortion. The symptoms included crampy pain, localized to the lower abdomen. The discomfort had been noted for between 3 weeks and 6 months. Each episode produced increasingly severe symptoms. In each of the 5 cases, endometriosis of the ovaries and/or Fallopian tubes was seen grossly at operation. Histological study of an ovary removed from one patient demonstrated endometriosis. Three cases had produced localized intramural masses, resembling a neoplasm; one of these had also caused partial involvement of a segment of ileum with mural thickening and luminal narrowing, leading to obstruction. The primary treatment was resection of the involved segment of bowel. None of the patients had a previous diagnosis of endometriosis, and none received hormonal medication nor castration. After resection of the involved small intestine, all 5 patients are free of intestinal symptoms for from 2 months to 13 yr.

1320 HYPERSECRETION OF GASTRIN ASSOCIATED WITH THE SHORT BOWEL SYNDROME. *(E.)*

Straus, E.; Gerson, C. D.; Yalow, R. S. (VA Hosp., Bronx, N.Y.). *Gastroenterology* 66(2): 175-180, 1974.

The possible role of gastrin in the acid hypersecretory state which is associated with the short bowel syndrome was assessed in 13 subjects, 4 with short bowel syndrome, 1 after jejunoileal bypass surgery for obesity, and 8 normal subjects. After an overnight fast, all subjects received a standard test meal consisting of 2 hard-boiled eggs, 1 slice of dry white toast, and 120 ml of orange juice. Plasma samples were obtained ar 15, 10 and 5 min prior to feeding and at 5, 10, 15, 20, 30, 40, 60, 90, and 120 min after completion of the meal. The mean values for basal and peak postprandial gastrin concentrations in the 8 control subjects were 43 pg/ml and 96 pg/ml, respectively. In all 4 patients with the short bowel syndrome, marked hypergastrinemia, characterized by high fasting levels, and a prompt sharp response to the standard test meal were observed. Fasting gastrin concentrations ranged from a low of 96 pg/ml to a high of 610 pg/ml. Three patients did not have gastrectomy, the times of the peak gastrin levels for them were achieved between 15 and 40 min, coinciding with the times of peak concentrations observed in the control group. The subsequent rate of fall after the peak appeared to be even more rapid in these 3 subjects than in the control group. It is concluded that these results are consistent with the possible existence of a factor in the distal small intestine that may play a role in inhibiting gastrin release.

1321 PREJEJUNAL TRANSPOSITION OF COLON TO PREVENT THE DEVELOPMENT OF SHORT BOWEL SYNDROME IN PUPPIES WITH 90 PER CENT SMALL INTESTINE RESECTION. *(E.)*

Hutcher, N. E.; Mendez-Picon, G.; Salzberg, A. M. (Med. Coll. Virginia, Richmond). *J. Pediatr. Surg.* 8(5):771-777, 1973.

The effect of colon transposition when jejunum was the principal segment remaining after resection was studied in purebred male beagle puppies. Group 1 (2 animals) consisted of the nonoperated controls. Group 2 (6 animals) underwent a 90% resection of small intestine, which left 7.5% proximal jejunum and 2.5% distal ileum. The ileocecal valve remained intact. Group 3 (6 animals) underwent an identical 90% resection of small intestine. The small intestinal continuity was reestablished. This was followed with transposition of an isoperistaltic colon segment between the fourth portion of the duodenum and the remaining small intestine. There were 2 operative deaths. The growth curve of the nonoperated controls forms the basis for predicting the growth of the operated animals. At the end of the 66-week study period, the animals weighed 10.2 kg. Animals in group 2 with 90% small-intestinal resection underwent resection at a mean age of 14.2 weeks and weighed 3.4 kg. A mean length of 24 cm of small intestine remained after resection. Of the 5 operative survivors, there were 2 nutritional deaths. They died at 58 and 80 days postoperatively. At time of death they had lost 31% of their preoperative body weight and were only 32.5% of their predicted weight. The remaining 3 animals were followed for 1 yr postoperatively. By the third postoperative month they had all regained their preoperative weight and over the next 9 months exceeded that weight by a mean of 53%. They attained 50.6% of their predicted weight at the end of the first postoperative year. The group 3 animals with 90% resection plus colon transposition had a mean length of 13.2 cm of colon transposed proximal to the mean length of 25 cm of small intestine remaining after resection. All animals exceeded their preoperative weight by a mean of 85%. Both Groups 2 and 3 developed a microcytic hypochromic anemia. All resected animals had delayed gastric emptying and decreased pylorus-to-cecum transit time. The stools from animals in Groups 2 and 3 were loose and bulky. It is concluded that the merit of colon transposition in modifying the clinical course after a 90% small-intestine resection leaving primarily jejunum is demonstrated.

1322 MALACOPLAKIA: AN ELECTRON-MICROSCOPIC STUDY: DEMONSTRATION OF BACILLIFORM ORGANISMS IN MALACOPLAKIC MACROPHAGES. *(E.)* Lewin, K. J.; Harell, G. S.; Lee, A. S.; Crowley, L. G. (Stanford Univ. Sch. Med., Calif.). *Gastroenterology* 66(1):28-45, 1974.

A case of malacoplakia of the bladder and intestinal tract is reported in which bacilliform organisms were demonstrated within the malacoplakic macrophages by light and electron microscopy. The female patient first presented at age 42 yr with generalized lymphadenopathy. Two yr later she presented with generalized lymphadenopathy, splenomegaly, and a mass lateral to the right breast. Five months later she developed an *Escherichia coli* urinary tract infection, unresponsive to numerous antibiotics. Cystoscopy 3 months later for continued cystitis revealed the entire bladder dome and the left lateral bladder wall to be involved by a fungating, firm, sessile, necrotic mass. Biopsy showed malacoplakia. Three months later, work-up for recurrent adenopathy revealed a recurrence of the right lateral breast mass, splenomegaly, and bilateral inguinal adenopathy. Lymphangiography demonstrated abnormal pelvic and para-aortic nodes consistent with lymphoma. Radiation therapy was delivered over a 2-week period. Her terminal admission was about a yr later with a white blood count of 500 mm and a hematocrit of 23%. She died 3 days after admission with pneumonia and renal failure. Protein electrophoresis and quantitative immunoglobulins revealed abnormally low immunoglobulin values. On electron microscopy, 2 types of cytoplasmic inclusions were found, those corresponding to the periodic acid Schiff-positive granules which are phagolysosomes, and the Michaelis-Gutmann bodies. Bacteria, probably coliforms, in various stages of degradation, were present within phagocytic vacuoles and phagolysosomes, sometimes in close apposition to phospholipid membranes. The Michaelis-Gutmann bodies developed within the phagolysosomes. It is postulated that the following sequence of events occurs in the pathogenesis of Michaelis-Gutmann bodies. Bacteria are phagocytosed by the malacoplakic macrophages, incorporated into phagolysosomes, and killed, but are incompletely digested. They persist as dense amorphous aggregates and phospholipid membranes which later become encrusted with calcium phosphate crystals to form the laminated Michaelis-Gutmann bodies. It is proposed that this case of malacoplakia was associated with altered immune status. The patient had lymphocytic lymphoma, which may be associated with depressed cell-mediated immunity, and, to a lesser degree, depressed immunoglobulin production. The patient's treatment consisted of long-term steroids and chlorambucil, both of which are lympholytic agents, and chlorambucil is a powerful immunosuppressant. Terminally, the patient was severely emaciated, and this may also have contributed to her depressed immunoglobulins.

1323 JEJUNAL L-LEUCYL-β-NAPHTHYLAMIDASE ACTIVITY IN NORMAL MAN AND IN PATIENTS WITH DIGESTIVE DISEASE. COMPARISON WITH JEJUNAL LACTASE AND MALTASE ACTIVITIES. *(Fr.)* Cerf, M.; Chariot, J.; Fox, A.; Debray, C. (Bichat Hosp., Paris, France). *Arch. Fr. Mal. App. Dig.* 62(6):481-487, 1973.

1324 HISTOCHEMICAL OBSERVATIONS OF ILEAL DIVERTICULUM IN MAN. *(It.)* Franzi, A. T.; Merlini, E. (Inst. Normal Human Anat., Univ. Genoa, Italy). *Boll. Soc. Ital. Biol. Sper.* 49(1/2):41-47, 1973.

1325 CARCINOMA OF THE DUODENUM: COMPARISON OF SURGERY, RADIOTHERAPY, AND CHEMOTHERAPY. *(E.)* Sakker, S.; Ware, C. C. (Southend Gen. Hosp., Eastwood, Australia). *Br. J. Surg.* 60(11):867-872, 1973.

1326 ACUTE NEO-NATAL DUODENAL STENOSIS. REPORT OF THREE CASES. *(E.)* Loiacono, L.; Tortorolo, G.; Butti, A. (1st. Clin. Gen. Surg., Rome, Italy). *Chir. Pathol. Sper.* 20(2):115-134, 1972.

1327 HEMORRHAGIC ENTERITIS WITH A RISK OF PERFORATION AFTER THE USE OF NALIDIXIC ACID. *(Ger.)* Trautmann, A.; Opitz, K. (Munic.

Hosp., Bielefeld, Germany). *Dtsch. Med. Wochenschr.* 98(50):2423-2424, 1973.

1328 CLINICAL SIGNIFICANCE OF PRECANCEROUS CONDITIONS IN THE SMALL INTESTINE, COLON, AND RECTUM. *(Ger.)* Jekic, M. (Gen. Hosp., Zemun-Beograd, Yugoslavia). *Helv. Chir. Acta* 40(5/6):743-746, 1973.

1329 ILEUS. *(E.)* Cantor, M. O. (no affil.). *J. Abdominal Surg.* 16(1):31-37, 1974.

1330 INTERNAL HERNIA WITH HIGH JEJUNAL OBSTRUCTION IN INFANCY DUE TO ADHESIONS FROM ANTENATAL MECONIUM PERITONITIS. *(E.)* Moore, T. C. (no affil.). *J. Pediatr. Surg.* 8(6):971-972, 1973.

1331 CONGENITAL JEJUNAL ATRESIA DUE TO A SEPTUM CONTAINING ECTOPIC PANCREATIC TISSUE. *(E.)* Suzuki, H.; Ohi, R.; Kasai, M. (no affil.). *J. Pediatr. Surg.* 8(6):981, 1973.

1332 ARTHRITIS AND INTESTINAL DISEASE. *(E.)* Haslock, I.; Wright, V. (South Teesside Hosp., Leeds, England). *J. R. Coll. Physicians Lond.* 8(2):154-162, 1974.

1333 CYTOLOGICAL CHANGES IN THE DUODENAL MUCOSA IN SOME DUODENAL DISEASES. *(Rus.)* Rapoport, S. I.; Tsirul'nikova, N. E.; Petrova, T. S. (All-Union Sci. Res. Inst. Gastroenterol., Moscow, USSR). *Lab. Delo* (8):467-470, 1973.

1334 VALUE OF DOUBLE INVERSION OF A SEGMENT OF SMALL INTESTINE AFTER EXTENSIVE ENTERECTOMY: EXPERIMENTAL STUDY ON 41 DOGS. *(Fr.)* Laurent, J. C.; Depadt, G.; Bournoville, M.; Lehut, J. M. (no affil.). *Lille Chir.* 28(3):71-81, 1973.

1335 MULTIPLE DOUDENAL DIVERTICULA: SIX CASE REPORTS. *(Sp.)* Rodriquez Cuartero, A.; Montero Garcia, M. (Dept. Intern. Med., Univ. Granada, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(2):161-168, 1973.

1336 MECHANICAL OBSTRUCTION OF THE INTESTINE AND SPONTANEOUS INTRAPERITONEAL RUPTURE OF THE BLADDER. RARE CAUSE OF ACUTE ABDOMEN. *(Sp.)* Cavagnaro, C. A.; Sclar, M.; Coria, O. (Ctr. Hosp., Mendoza, Argentina). *Rev. Esp. Enferm. Apar. Dig.* 41(2):203-208, 1973.

1337 IMMUNOLOGY OF INTESTINAL TUMORS. *(Fr.)* Martin, F.; Martin, M. S. (Fac. Med., Dijon, France). *Rev. Fr. Gastroenterol.* (87):17-18, 1973.

1338 SURGICAL CORRECTION OF RECURRENT JEJUNAL FISTULA BY IMPLANTATION OF DURA MATER PRESERVED IN GLYCERINE: NEW TECHNIQUE. *(Por.)* Haddad, J.; Ellenbogen, G.; Pigossi, N.; Raia, A. (Fac. Med., Univ. Sao Paulo, Brazil). *Rev. Hosp. Clin. Fac. Med. Sao Paulo* 28(2):87-90, 1973.

See also, 1111, 1113, 1151, 1153, 1155, 1169, 1177, 1178, 1199, 1228, 1274, 1284, 1286, 1525.

SMALL INTESTINE

Malabsorption

1339 FATTY ACID COMPOSITION OF PLASMA LIPOPROTEINS IN CONTROL SUBJECTS AND IN PATIENTS WITH MALABSORPTION. *(E.)* Shimoyama, T.; Kikuchi, H.; Press, M.; Thompson, G. R. (Hyogo Coll. Med., Japan). *Gut* 14(9):716-722, 1973.

The fatty acid composition of plasma lipids and lipoproteins was studied in fasting blood samples taken from 14 normal controls, 5 patients with diseases other than malabsorption, and 24 patients with intestinal malabsorption. Malabsorption resulted from intestinal resection in 6 patients, adult celiac disease in 12, and from other causes (pancreatic dysfunction, intestinal lymphangiectasia, and blind-loop syndrome) in 6. All patients were on a normal ward diet with the exception of 3 patients with celiac disease who were on a gluten-free diet. The lineolate content of plasma lipids was significantly lower in patients with malabsorption than in normal controls. This decrease was more evident in the percentage composition of the fatty acids of lecithin and cholesterol ester than that of the triglyceride fraction and was accompanied by reciprocal increases in the proportion of saturated and monounsaturated fatty acids. Many of these patients had reduced concentrations of cholesterol ester, triglyceride, and phospholipid so that there was often an absolute as well as a proportional decrease in plasma linoleate. The observation of similar, but less pronounced, differences in sick controls suggests that malabsorption of dietary linoleate is not the only factor involved. A reduced intake of fat probably played a major role in both groups of patients, and nonspecific hepatic dysfunction which commonly accompanies fevers could have been a contributory factory among the sick controls. Among the patients with malabsorption, changes in the plasma fatty acid composition were more marked in patients with intestinal resection than in those with adult celiac disease or steatorrhea due to other causes. This difference was apparently not related to the severity of the malabsorption since steatorrhea was least marked in the resection group; there was no correlation with the duration of the illness. Unequivocal evidence of fatty acid deficiency, defined as the presence of significant amounts of eicosatrienoic acid in plasma lecithin, was observed with a concomitant decrease in arachidonate in only 2 patients. The failure to find differences in the fatty acid composition of different classes of lipoproteins (high-density, low-density, and very low-density) in patients with malabsorption suggests that differences between the cholesterol esters are due to preferential incorporation of linoleate into low- and high-density lipoproteins. It is concluded that some degree of essential fatty acid depletion is common in hospitalized patients, whether or not they have malabsorption. Actual deficiency, however, is much less common and appears to occur primarily in patients who have malabsorption secondary to intestinal resection.

1340 PROTEIN SYNTHESIS BY HUMAN INTESTINAL MUCOSA: VARIATIONS WITH DISEASES OF THE GUT.

(E.) Warshaw, A. L.; Laster, L. (Digestive Hereditary Dis. Br., Natl. Inst. Health, Bethesda, Md.). *J. Surg. Res.* 14(4):285-293, 1973.

Studies of protein synthesis by human intestinal mucosa were performed by determining the *in vitro* incorporation of U-^{14}C-L-leucine into total proteins of peroral mucosal biopsy specimens. The mean value for normal mucosa was 1483 cpm/mg/30 min. In mucosa from 5 patients with celiac disease the mean value for mucosal protein synthesis was 3056 cpm/mg/30 min, a significant elevation, perhaps reflective of abnormally high cell turnover in this disease. In mucosa from 2 patients with abetalipoproteinemia the mean value for protein synthesis was 535 cpm/mg/30 min. This value, which is significantly lower than normal, may be related to diminished or absent synthesis of betalipoproteins by the intestine in this disease. The mean value for mucosal protein synthesis among 5 patients with treated Whipple's disease in remission was normal. Patients with regional enteritis (2 females) were also studied. In one patient the entire small intestine was involved and increased loss of plasma protein into the gastrointestinal tract was occurring. Steatorrhea amounted to about 10-20% of the dietary fat intake. The value for incorporation of leucine-U-^{14}C into protein by mucosa from these 2 women was 2800 to 2192 dpm/mg/30 min. Measurement of protein synthesis by intestinal mucosa obtained by peroral biopsy appears useful in assessing metabolic aberrations and adaptations of the gut.

1341 MUCOSAL SECRETORY IgA AND SECRETORY PIECE IN ADULT COELIAC DISEASE.

(E.) Shiner, R. J.; Ballard, J. (Central Middlesex Hosp., London, England). *Gut* 14(10):778-783, 1973.

Immunofluorescence studies with specific antisera to secretory IgA (11S IgA) and secretory piece (a glycoprotein found in the gastrointestinal epithelial cells) were performed on the jejunal mucosa of 9 patients, aged 16 to 56 yr, with adult celiac disease (treated and untreated). The jejunal biopsies from 8 non-celiac patients, aged 13 to 59 yr, served as controls. Four of these patients had no gastrointestinal disease; the other 4 had local and systemic IgA (7S) deficiency with normal villous architecture. In untreated celiac patients, fluorescent staining with antisera to 11S IgA and secretory piece was seen in the basement membrane of surface and crypt epithelial cells and the surrounding connective tissue, as well as in the upper third of the epithelial cells where it is normally found. In the 5 treated celiac patients, staining was mainly confined to the upper third of the epithelial cells. The distribution of staining seemed to be related to the histological state of the jejunal mucosa in the celiac patients. In those patients with a subtotal villous atrophy, staining of the basement membranes and connective tissue, as well as the upper third of the epithelium, was observed. In those with milder mucosal abnormalities (partial villous atrophy), who were on low-gluten diets, the 11S IgA and secretory piece showed a normal distribution. It is proposed that in normal situations, locally produced 7S IgA passes through the intercellular spaces to enter the upper third of the epithelium where it combines with secretory piece to form 11S IgA. This is then transported across the microvilli into the lumen. An additional pathway is proposed in pathological states in which a backflow of 11S IgA from the epithelium to the lamina propria occurs. The exact site of 11S IgA formation in celiac disease is not known, but it probably occurs in the upper third of epithelial cells as in normal patients.

1342 A SIMPLE THIN-LAYER CHROMATOGRAPHIC TECHNIQUE FOR THE ASSAY OF INTESTINAL DIPEPTIDE HYDROLASES FROM HUMAN MUCOSAL BIOPSY MATERIAL.

(E.) Lentze, M.; Schaub, J.; Harms, K. (Children's Clin., Univ. Munich, Germany). *Clin. Chim. Acta.* 49:19-26, 1973.

Specimens of intestinal mucosa were obtained from 60 children ranging in age from one month to 6 yr. The children were divided into 4 groups: (1) 22 controls; (2) 10 children with clinical signs of untreated celiac disease; (3) 16 children with treated celiac disease; and (4) 12 children with malabsorption syndrome. The homogenized specimen was mixed with the same volume of dipeptide substrate in a pH 8.5 phosphate-citrate-borate buffer and was incubated at 37°C. Ascending thin-layer chromatography was performed with a mixture of pyridine-dioxane-25% ammonia-water (35:35:15:15) for all substrates except glycine-glutamine, for which a mixture of phenol and formic acid (15%) was used. Dipeptides and the corresponding amino acids were located by staining with a ninhydrin solution. The activities of 11 dipeptide hydrolases and the disaccharidases maltase, isomaltase, sucrase, and lactase were measured. Human intestinal mucosa hydrolyzed the dipeptides, tryptophan-tyrosine and alanine-leucine. Enzymes hydrolyzing these substrates were decreased in children with untreated celiac disease and were nearly normal after treatment with a gluten-free diet. With the exception of valine-glutamic acid and valine-proline dipeptide hydrolases, activities of the dipeptide hydrolases were normal or only slightly decreased in group (3). Lactase deficiency was diagnosed in 70% of the patients in group (2). The activity of lactase was lower than the activities of isomaltase, maltase, and sucrase in group (3) patients. Decreased lactase activity was also found in 41% of the children in group (4). The advantage of thin-layer chromatography over the amino acid oxidase method is that the former can be used to detect glutamic acid, proline, alanine, asparagine, glycine, and hydroxyproline, while the latter cannot.

1343 ECTOPIC GASTRIC MUCOSA IN CELIAC SPRUE. *(E.)* Trier, J. S.; Moxey, P. C.; Fordtran, J. S.; MacDermott, R. P. (Boston Univ. Sch. Med., Mass.). *Gastroenterology* 65(5):712-727, 1973.

A 56-year-old female patient with celiac sprue and extensive gastric ectopia of the small intestine is described. The diagnosis of celiac sprue was documented by: the presence of a typical mucosal lesion and intestinal malabsorption; clinical and histological improvement after gluten withdrawal; and recurrence of symptoms together with histological deterioration after an oral gluten challenge. Fundic-type gastric mucosa containing parietal and chief cells was found in the mucosa of all sampled levels of the small intestine including proximal and distal duodenum, proximal, middle, and distal jejunum, and proximal ileum. Jejunal perfusion demonstrated secretion rather than absorption of water and electrolytes, diminished glucose absorption, and a markedly reduced ratio of urea to tritiated water diffusion rates. Although there was no evidence of hydrogen ion secretion by the parietal cell-containing jejunal mucosa during the basal state, bicarbonate absorption occurred during both histamine and pentagastrin infusion, suggesting a limited amount of acid secretion during stimulation.

1344 HL-A1 AND HL-A8 ANTIGENS ASSOCIATED WITH CELIAC DISEASE IN CHILDREN. *(Ger.)* Ludwig, H.; Polymenidis, Z.; Granditsch, G.; Wick, G. (Inst. Immunol., Univ. Vienna, Austria). *Z. Immunitaetsforsch.* 146(2):158-167, 1973.

The histocompatibility antigen (HL-A) phenotype was established by the micro lymphocyte toxicity test for 24 children, aged 6 months to 14 yr, with celiac disease diagnosed by history and clinical findings, direct and indirect laboratory evidence of malabsorption, small intestine biopsy, response to gluten-free diet, and immunofluorescence examination of sections from small intestine biopsies. Controls consisted of 240 candidates for kidney transplants, kidney donors, and blood donors; none of the controls was related to the patients with celiac disease or to one another. HL-A1 was present in 15 (62.5%) and HL-A8 in 16 (66.7%) of the children with celiac disease, but in only 71 (29.6%) and 39 (16.3%) of the controls, resp. This difference is statistically significant. Both antigens were present in 14 of the 24 patients with celiac disease. The genotypes of 13 children were established by tissue typing of 11 families. HL-A8 was present in 10 of these 13 children and was associated with HL-A1 in 9 of the 10. The two antigens were found to be inherited as a haplotype, either from the father or the mother. The haplotype HL-A1,8 was also found in 3 normal siblings of these children. The HL-A1,8 haplotype is not a direct cause of celiac disease, but must be associated with other, unknown factors for the disease to develop.

1345 AN IN VITRO MODEL OF GLUTEN-SENSITIVE ENTEROPATHY: EFFECT OF GLIADIN ON INTESTINAL EPITHELIAL CELLS OF PATIENTS WITH GLUTEN-SENSITIVE ENTEROPATHY IN ORGAN CULTURE. *(E.)* Falchuk, Z. M.; Gebhard, R. L.; Sessoms, C.; Strober, W. (Natl. Cancer Inst., Bethesda, Md.). *J. Clin. Invest.* 53(2):487-500, 1974.

Jejunal biopsy specimens from 11 patients with gluten-sensitive enteropathy (obtained during gluten challenge), 11 normal individuals, and 3 patients with other gastrointestinal abnormalities were cultured *in vitro* for 48 hr in the presence or absence of a peptic-tryptic digest of gliadin. In the absence of gliadin, alkaline phosphatase activity in the biopsy specimens from normal control individuals increased from an initial value of 384 U to a 48 hr value of 561 U. The initial alkaline phosphatase activity of specimens from patients with gluten-sensitive enteropathy was lower than that of normals, 117 U, and increased to a 48 hr value of 399 U. The biochemical change in cultured biopsy specimens of gluten-sensitive enteropathy patients correlated with increases in the length and regularity of brush borders of epithelial cells as seen with the electron microscope. In the presence of a peptic-tryptic digest of gliadin, alkaline phosphatase activity of biopsy specimens of control individuals increased from an initial value of 384 U to a 48 hr value of 578 U. In contrast, the alkaline phosphatase activity of biopsy specimens of patients with gluten-sensitive enteropathy in exacerbation showed a markedly diminished increase in activity during 48 hr of culture; in this case initial activity was 117 U and final activity was 203 U. This inhibitory effect on increase of alkaline phosphatase activity during organ culture was specific in that a peptic-tryptic digest of casein (a protein not toxic *in vivo* to patients with gluten-sensitive enteropathy had no effect on alkaline phosphatase increases in culture. These results obtained with biopsy specimens from gluten sensitive patients in exacerbation were compared with results obtained from patients with gluten-sensitive enteropathy in remission. Alkaline phosphatase activity of specimens from the latter group of patients also increased during culture bu but in this instance peptic-tryptic digest of gliadin in the culture medium had no significant inhibitory effect. The inhibitory effect of gliadin on intestinal epithelial cells in organ culture represents an *in vitro* model of gluten-sensitive enteropathy. As this effect of gliadin is not seen in cultures of specimens from patients in remission, it appears that gliadin is not directly toxic to gluten-sensitive enteropathy jejunal mucosa per se, but rather toxicity requires the participation of an endogenous effector mechanism which must first be stimulated *in vivo*.

1346 A NEW SYNDROME OF BILE ACID DEFICIENCY: A POSSIBLE SYNTHETIC DEFECT. *(E.)* Powell, G. K.; Jones, L. A.; Richardson, J. (Univ. Texas Med. Branch, Galveston). *J. Pediatr.* 83(5): 758-766, 1973.

A case report is presented of a 3-month-old infant with chronic diarrhea, failure to thrive, and severe malabsorption of fat (50%) who had low concentrations of bile acids in the duodenal fluid, with poor micellar incorporation of fatty acids. The deficiency of intraluminal bile acids was not due to (1) liver disease, (2) deconjugation of bile acids associated with bacterial overgrowth, (3) failure of intestinal reabsorption of bile acids, (4) failure of release of cholecystokinin, or (5) an excretion defect of bile acids. A trial of oral administration of bile acids produced increases in weight gain, absorption of fat, intraluminal micellar incorporation, and concentrations of intestinal bile acids. All of these returned to pretreatment values within a few days after discontinuance of administration of bile acids. A defect in the biosynthesis of bile acids, not secondary to liver disease, is suggested.

1347 CYSTIC FIBROSIS AND COELIAC DISEASE. REPORT OF TWO CASES. *(E.)* Taylor, B.; Sokol, G. (Hosp. Sick Children, London, England). *Arch. Dis. Child.* 48(9):692-696, 1973.

Two cases of celiac disease occurring in children with cystic fibrosis are presented. The disacchridase levels in duodenal biopsies from the first child included: lactase, 0.15; sucrase, 0.54; and maltase, 5.8. After 1 yr on a gluten free diet the respective figures were 0.2, 1.3, and 4.9. For the second child, lactase was 0.1; sucrase, 0.4. After 9 months on the gluten free diet, the respective figures were: 0.9 and 2.8. Normal value for lactase is over 2.5; for sucrase, over 3.0; and for maltase, over 10.0. Crystic fibrosis was diagnosed in both children through high sweat sodium levels. The 2 main theories as to the pathogenesis of coeliac disease involve the immunological status and a postulated toxic action of gluten on small intestinal mucosa associated with a congenital absence of a peptidase concerned in gluten digestion. Gluten intolerance might be more likely with abnormal pancreatic exocrine function. Intestinal wall enzymes may be deficient as well in cystic fibrosis. The values of intestinal disaccharidases improved in each case on the gluten free diets, but not to normal values. The coexistence of cystic fibrosis and celiac disease in association with low disaccharidase levels lends some support tp the theory of enzyme deficiency playing a part in the causation of celiac disease.

1348 PLASMA GROWTH HORMONE IN COELIAC DISEASE. *(E.)* Vanderschueren-Lodeweyckx, M.; Wolter, R.; Molla, A.; Eggermont, E.; Eeckels, R. (Dept. Pediatr., Catholic Univ., Louvain, Belgium). *Helv. Paediatr. Acta* 28(4):349-357, 1973.

Insulin tolerance tests were performed in 60 normal prepubertal children, 13 patients with active celiac disease and 4 treated subjects with gluten intolerance. Plasma levels of glucose, growth hormone and cortisol were followed. In untreated patients, the fall of blood glucose compared well to that of normal children, but there was no responsiveness to hypoglycemia. Gluten-free diet restored the normal responsiveness. In 9 of 13 untreated celiac subjects the maximal level of plasma growth hormone was below the mean -2SD of the values observed in normal subjects. In 3 of 4 treated celiac patients plasma growth hormone increased normally. However, 1 treated patient, who did not grow satisfactorily, showed a blunted response of plasma growth hormone. Plasma cortisol rose normally during the first 60 min in the patients with active celiac disease, but remained high up to 120 min. These results indicate that gluten enteropathy results in some degree of pituitary hypofunction perhaps due to decreased synthesis and release of somatotropic releasing factor by the hypothalamus and by a depressed production and release of somatotropic hormone by the pituitary gland. Thus it is necessary to exclude celiac disease whenever the release of growth hormone, following the administration of insulin, is impaired.

1349 TRANSIENT LACTOSE INTOLERANCE IN INFANCY. *(E.)* Bartrop, R. W.; Hull, D. (Hosp. Sick Children, London, England). *Arch. Dis. Child.* 49(12):963-966, 1973.

Transient lactose intolerance in infancy was examined in 100 infants with disaccharide intolerance secondary to a variety of bowel disorders. The primary diagnoses of the 100 infants with diarrhea which improved when lactose was removed from the diet include: infective diarrhea, nonspecific diarrhea, bowel surgery, gluten enteropathy, cystic fibrosis, and miscellaneous. The majority of infants who showed features of intolerance were less than 3 months old. The infants were maintained on a disaccharide free diet for over 40 weeks. However, reintroduction after 2 months was successful in 20 out of

22 children in whom it was attempted. The infants given sugar-free diets for over one year usually suffered from gluten enteropathy. Successful reintroduction of cow's milk occurred in 83 children, the diet being continued at follow-up in 8 others. Four children died from the primary pathology. Five children (4 with infective and nonspecific diarrhea, 1 with gluten enteropathy) had periods of bowel rest from several days to 2 weeks, followed by the gradual reintroduction of milk feeds containg disaccharide. The analysis suggested that infancts with troublesome, persistent diarrhea under the age of 6 months should be treated with a lactose-free diet, but that lactose might be introduced once the the child is thriving and stools have returned to normal consistency.

1350 PLASMA LIPID AND LIPOPROTEIN ABNORMALITIES IN PATIENTS WITH MALABSORPTION. *(E.)* Thompson, G. R.; Miller, J. P. (Hammersmith Hosp., London, England). *Clin. Sci. Mol. Med.* 45(5):583-592, 1973.

Plasma lipids and lipoproteins were studied in 16 control subjects and 24 patients with various types of steatorrhoea, including: intestinal resection, adult coeliac disease, carcinoma of pancreas, chronic pancreatitis, intestinal lymphangiectasia, and blind loop. Low plasma cholesterol levels were found in malabsorbers and were associated with decreased amounts of low-density lipoprotein (LDL) in males and high-density lipoprotein (HDL) in females. Serum triglyceride levels were normal in males, but exceeded control values in some of the females, due to an increase in very low-density lipoprotein. LDL composition was abnormal in both male and female malabsorbers, with a decreased proportion of cholesterol ester and an increased proportion of triglyceride. There was also an increased proportion of triglyceride in HDL. These findings show that malabsorption markedly influences not only the concentration but also the composition of plasma lipoproteins.

1351 LACTOSE MALABSORPTION IN OKLAHOMA INDIANS. *(E.)* Bose, D. P.; Welsh, J. D. (Oklahoma State Univ., Oklahoma City). *Am. J. Clin. Nutr.* 26(12):1320-1322, 1973.

Lactose malabsorption was studied in 41 American Indians of various tribes. There were 36 adults (age 18 to 57 yr) and 5 children (age 3 to 22 months). Thirty-seven had only an oral lactose tolerance test (LTT). 2 had only an assay of intestinal enzymes, and 2 had both the LTT and assay. LTTs were performed using 1 g lactose/kg body wt. Capillary blood glucose was determined by the Nelson-Somogyi method, and a rise of blood glucose of 20 mg/100 ml or less was considered to indicate lactose malabsorption. Twenty-nine of the 36 adults (80%) and none of the 5 children had lactose malabsorption. Of the 24 adults who were symptomatic, 10 recognized intolerance to milk previously. Seven drank no milk at all and therefore could not indicate whether or nor they were symptomatic. Thirty-one of the 36 adults drank less than 1 qt of milk/week. There was no apparent relationship between present milk drinking and lactose absorption. The mean blood glucose rise for the 7 adult absorbers was 41 mg/100 ml, and the 29 adult non-absorbers had a mean rise of 7 mg/100 ml. Two of the absorbers and 24 of the non-absorbers had symptoms. It is concluded that the majority of adult American Indians of North America are lactose intolerant. Therefore, milk drinking habits within this ethnic group need further consideration.

1352 LACTOSE FEEDING IN LACTOSE-INTOLERANT MONKEYS. *(E.)* Wen, C.; Antonowicz, I.; Tovar, E.; McGandy, R. B.; Gershoff, S. N. (Harvard Sch. Publ. Hlth., Boston, Mass.). *Am. J. Clin. Nutr.* 26(11):1224-1228, 1973.

1353 PROTEIN-LOSING ENTEROPATHIES OF LYMPHATIC ORIGIN: PART 1. SYMPTOMATOLOGY AND EXAMINATION. *(Fr.)* Fortas, L.; Frexinos, J. (Purpan Hosp., Toulouse, France). *Arch. Fr. Mal. App. Dig.* 62(6):501-512, 1973.

1354 MUSHROOM INTOLERANCE CAUSED BY SELECTIVE MALABSORPTION OF TREHALOSE. *(Fr.)* Bergoz, R. (Univ. Cantonal Hosp., Geneva, Switzerland). *Rev. Fr. Gastroenterol.* (86):29-34, 1973.

1355 DRUG-INDUCED MALABSORPTION. *(E.)* Kendall, M. J.; Chan, K. (Queen Elizabeth Hosp., Birmingham, England). *Xenobiotica* 3(11):727-744, 1973.

See also, 0879, 1142, 1147, 1164, 1181, 1210, 1268, 1323.

1356 NECROTIZING COLITIS. *(E.)* Rosen, I. B.; Cooter, N. B.; Ruderman, R. L. (Univ. Toronto Med. Sch., Canada). *Surg. Gynecol. Obstet.* 137(4):645-649, 1973.

Gross examinations were made of colon specimens from 5 patients with gangrene of the colon which was thought to be ischemic in nature; no mesenteric vascular occlusion was detected. Findings included normal-looking intestine, thickened edematous intestine with mucosal ulceration, and obvious gangrenous colon. Only one patient recovered after surgery. The mucosa in all cases was more severely affected than would be expected from the serosal aspect of colon. Mixed gram-positive and gram-negative organisms were found in necrotic mucosa, and occasionally in the submucosa and lumen of submucosal vessels. All of the patients were over 55 yr old and were afflicted with such conditions as asthma, bronchitis, Parkinson's disease, and rheumatoid arthritis. Prodomic symptoms of abdominal pain, distention, and constipation were common. Constipation, fevers of one or two degrees, vomiting of bile-stained fluid, toxicity, and generalized peritonitis with findings most marked in the left lower quadrant of the abdomen developed in the acute phase of this condition. Low grade leukocytosis and elevation of the blood urea nitrogen level were present in all patients. On x-ray examination, necrotizing colitis resembled perforated diverticulitis with a pseudovolvulus appearance. The best treatment consists of adequate resection, temporary stomas, and delayed union of the intestine. Left untreated, necrotizing colitis is lethal.

1357 SEGMENTAL DISEASES OF THE COLON ABOVE STENOSING NEOPLASMS. *(It.)* Puglionisi, A.; Asole, F.; Mantovani, M. (Inst. Special Surg. Pathol., Sacred Heart Catholic Univ., Rome, Italy). *Chir. Gastroenterol.* 7(1):47-66, 1973.

A 46-yr-old woman presented with a 5-month history of pain in the left iliac fossa which had increased in intensity. She had recently become constipated and resorted to laxatives but noticed blood in her stools. Laboratory tests revealed a slight decrease in the RBC, an increase in the WBC, a significant increase in the erythrocyte sedimentation rate, a decrease in plasma albumin with a normal total protein concentration, and traces of albumin, glucose, mucus, and pus in the urine. A barium enema showed stenosis between the sigmoid and rectum which was identified as an adenocarcinoma of the sigmoid by rectosigmoidoscopy. At laparotomy the colon above the tumor had the consistency which is characteristic of ulcerative colitis, so the portion between the middle of the transverse colon and the rectosigmoid junction was removed. Pathological examination of this specimen showed a normal mucosa for about 3 cm above the tumor. Diffuse ulcerative colitis, characterized by total loss of the epithelium from the ulcer surface, was found proximal to the normal mucosa. Perls' test for hemosiderin was positive in the submucosa, indicating that hemorrhagic extravasation had occurred. This is considered to be a manifestation of colitis which results from ischemia and congestion. This conclusion was supported by the antimesenteric, symmetrical distribution of the ulcerative lesions in the colon where blood vessels are exposed to ischemia from increased pressure within the colon.

1358 LARGE BOWEL CANCER IN HAWAIIAN JAPANESE. *(E.)* Haenszel, W.; Berg, J. W.; Segi, M.; Kurihara, M.; Locke, F. B. (Natl. Cancer Inst., Bethesda, Md.). *J. Natl. Cancer Inst.* 51(6):1765-1779, 1973.

A study of 179 Japanese patients with bowel cancer and 357 hospital controls in Hawaii revealed excess risks for persons who regularly ate Western-style meals only. The similarity in findings for Issei and Nisei contrasts with results previously reported for stomach cancer in Issei and Nisei, where the reduced risk among persons regularly eating Western-style meals only was limited to the second-generation Nisei. Bowel cancer was associated with consumption of specific foods. Bowel cancer patients ate meats, legumes, and starches more frequently, with the case-control disparity being less pronounced for individuals consuming starches than for those eating meat and legumes. Beef and string beans were the major contributors to the meat and legume effects. There seemed to be separate effects for beef, string beans, and starches, and the case-control contrasts were strengthened when various combinations of foods were considered. Points of consistency between the Hawaii study and other evidence were noted. The findings on beef had the most immediate relevance. These results may narrow the area of search for etiologic factors and thus assist in planning future research on the complex sequence of events leading to bowel cancer.

1359 DETECTION BY IMMUNOFLUORESCENCE OF CARCINOEMBRYONIC ANTIGEN IN COLONIC CARCINOMA, OTHER MALIGNANT OR BENIGN TUMOURS AND NON-CANCEROUS TISSUES. *(E.)* Bordes, M.; Michiels, R.; Martin, F. (Fac. Med., Dijon, France). *Digestion* 9(2):106-115, 1973.

The indirect fluorescence method has been used to detect and localize carcinoembryonic antigen in specimens of colonic carcinoma, other malignant or benign tumors, and non-cancerous tissues. The antigen was found in 39 of 41 specimens of colonic or rectal adenocarcinomas with a characteristic location at the apical pole of the cancerous cells lining the lumen of the glands. Carcinoembryonic antigen was present in 2 metastases of colonic adenocarcinoma, 1 in the liver and 1 in abdominal lymph nodes. Both cases showed the characteristic linear pattern of the primary tumor. The antigen was not detected in 2 samples of anaplastic colonic carcinomas. Furthermore, carcinoembryonic antigen was occasionally found in some other digestive or nondigestive carcinomas, including 3 located in the stomach. It was also present in 19 benign colorectal polyps examined and in the majority of 85 morphologically non-malignant colonic glands obained from specimens excised for cancerous or non-ancerous diseases. The identity of carcinoembryonic ntigen in non-cancerous adult colon was established y its characteristic apical localization and by isappearance of fluorescence after absorption of he antiserum by a weak concentration of purified arcinoembryonic antigen. It is suggested that the resence of this antigen in adult non-malignant colon ay explain its increase in the serum of some patients ith ulcerative colitis or Crohn's disease.

360 DISTURBANCE OF CELL-MEDIATED IMMUNITY IN PATIENTS WITH CARCINOMA OF COLON AND REC-UM.

(E.) Manousos, O. N.; Economidou, J.; Path-uli, C.; Merikas, G. (Hippokration Gen. Hosp., thens, Greece). *Gut* 14(9):739-742, 1973.

he cellular immune mechanisms of 20 patients (14 ales and 6 females, aged 33-75 yr) with histologic-lly verified adenocarcinoma of colon or rectum were valuated by studying the lymphocyte response to HA stimulation. In each patient this response was tudied in the presence of his own serum and in that f serum from a normal control of the same blood roup. The degree of basic transformation was ssessed by studying the morphology of the cells nd the incorporation of H^3 thymidine into DNA by toradiography. The highest degree of blastic ansformation occurred in lymphocytes of normal sub-ects cultured in the presence of their own serum. he smallest, occurred in cultures of lymphocytes cancer patients cultured in their own serum. Up-ke of H^3 thymidine followed a similar pattern. ntrol lymphocytes showed higher degrees of trans-rmation when cultured with their serum than when rum from cancer patients was present. The degree lymphocyte transformation from cancer patients d not alter significantly whether cultured in their n serum or the serum from healthy controls. Meta-atic cancer was present in 14 of the 20 cases and 9 of these 14 the degree of blastic transformation s above 60%, and it was below 40% in only 3 of the . These results indicate that lymphocytes of can-r patients in their natural environment show a de-eased response to the mitogenic factor PHA. The ppression of normal lymphocytes by the serum of ncer patients supports the theory that an agent sponsible for the decreased transformation resides the serum of the cancer patient. However, the ck of significant improvement in the degree of ansformation when lymphocytes from cancer patients re cultured in serum from controls suggests that ere must also be an inherent defect in the lympho-tes.

51 SODIUM CONSERVATION AFTER TOTAL OR SUB-TOTAL COLONIC RESECTION IN CHILDREN.

(E.) cour, C.; Millot, M.; Balsan, S. (Childrens Hosp., ris, France). *Scand. J. Gastroenterol.* 3):743-750, 1973.

ume of stools, and urine, fecal and urinary ex-etion of sodium, and potassium and urinary excre-n of tetrahydroaldosterone were analyzed in 6 ants (aged 13 to 15 months) and 2 children (aged nd 6 yr) with ileostomies or colostomies. The study was performed using balance techniques. The sole variable was a stepwise reduction of sodium intake, every 6 days. In the absence of the colon, adaptation of the small intestine to sodium restriction was manifested by a decrease in mean fecal sodium concentration and excretion. This phenomenon occurred against a concentration gradient rising from 10 to 80 mEq/l. It seems likely that this enhanced sodium transport was accompanied by a water flux, indirectly demonstrated by reduction of stool volume and by a simultaneous increase of urine flow. During this process, the luminal content remained iso-osmotic because of a significant rise in fecal potassium concentration. A simultaneous rise in the urinary excretion of tetrahydroaldosterone suggests that aldosterone may play a part in the control of sodium conservation at the level of the small intestine. However, symptoms of depletion appear if the intake is reduced to 1 mEq/kg/24 hr, indicating that ileal conservation of sodium is quite limited. When a colonic segment was preserved, sodium balance remained normal even when intake was reduced to 0.3 mEq/kg/24 hr over 6 days. The prevention of fluid and electrolyte depletion in children without a functional colon can be avoided provided a few rules are followed. Survey of such patients should include weight measurements, serum sodium concentration, and 24-hr urinary sodium excretion. In this series a water intake of 150 to 250 ml/kg/24 hr and a sodium intake of 6 to 10 mEq/kg/24 hr permitted satisfactory electrolyte balance without secondary hyperaldosteronism. Maintenance of natriuresis at a level not below 3 mEq/kg/24 hr will avoid accidental sodium and water depletion and cause secretion of aldosterone to remain in normal limits.

1362 LINCOMYCIN AS A CAUSE OF PSEUDOMEMBRANOUS COLITIS.

(E.) Scott, A. J.; Nicholson, G. I.; Kerr, A. R. (Auckland Hosp., New Zealand). *Lancet* (7840):1232-1234, 1973.

Pseudomembranous colitis was studied in 8 patients (6 males and 2 females, aged 21-67 yr). In 7 cases the administration of lincomycin preceded the illness. Of these 7, 3 patients died. An association between pseudomembranous colitis and lincomycin is supported by the frequency with which the disease has been diagnosed since the widespread introduction of the drug. This association also illustrates the role of a disturbance of gut flora in the pathogenesis of some forms of pseudomembranous colitis. It is suggested that lincomycin be used with caution, and only for serious infections such as staphylococcal osteomyelitis and anaerobic infections involving *Bacteroides* spp. If the antibiotic effect of lincomycin is causing the colitis to develop, then similar results must be anticipated with use of the related drug, clindamycin.

1363 INHIBITION OF LEUCOCYTE MIGRATION BY TUMOUR-ASSOCIATED ANTIGENS OF THE COLON AND RECTUM.

(E.) Guillou, P. J.; Giles, G. R. (Leeds Univ. Hosp., England). *Gut* 14(9):733-738, 1973.

The test of leucocyte migration inhibition has been used to detect lymphocyte sensitization to tumor-associated antigens of the colon and rectum. Samples of rectal or colonic adenocarcinomata were obtained from fresh operative specimens, pooled, homogenized, and extracted with perchloric acid. Normal mucosa from the same resected specimens was obtained at least 10 cm away from the tumor site and subjected to the same procedure as the tumor tissue. Following ultracentrifugation and dialysis, the supernatants were lyophilized and the protein content was estimated. Antisera to tumor tissue extract and normal colonic mucosal extract were raised in rabbits and the presence of tumor-associated antigens was demonstrated by the technique of Ouchterlony double-diffusion in Noble agar. Immunodiffusion procedures were performed on each sample of antigen to be certain of continued isolation of antigen from each pool of tumor obtained. The circulating lymphocytes of 22 patients (aged 46-84 yr) suffering from colorectal adenocarcinomata of various stages have been examined and compared with the results obtained for identical studies performed on the peripheral lymphocytes of 15 control subjects. Distant metastases was noted in 13 patients, nodal involvement only in 8, and in 1 case the tumor had only penetrated the muscle coat. Sensitization of lymphocytes to tumor antigen was demonstrated in 15 of the 22 patients when culture was performed in homologous AB serum. Of these 15, only 6 showed inhibition of leucocyte migration in the presence of tumor extract when culture was performed in autologous serum. These observations suggest that factors exist in the serum of such patients which prevent the expression of cellular immunity to tumor antigens.

1364 A RAT MODEL FOR STUDYING COLONIC CANCER: EFFECT OF CHOLESTYRAMINE ON INDUCED TUMORS.

(E.) Nigro, N. D.; Bhadrachari, N.; Chomchai, C. (Dept. Surg., Wayne State Univ., Detroit, Mich.). *Dis. Colon Rectum* 16(6):438-443, 1973.

The effectiveness of dimethylhydrazine, azoxymethane, and methylazoxymethanol in producing malignant tumors in the large intestine of male Sprague-Dawley rats and methods of improving the yield of such tumors was investigated. A group of 24 rats received dimethylhydrazine (15 mg/kg, s.c./week). A second group of 24 received azoxymethane (8 mg/kg, s.c./week). Of the dimethylhydrazine group, 20 rats developed a total of 91 intestinal tumors. All azoxymethane rats developed tumors totalling 131. With dimethylhydrazine there were about the same number of lesions in the small as in the large intestine. A striking preponderance of tumors occurred in the proximal half of each segment of the intestinal tract with either carcinogen. At least 75% of all lesions were polypoid; the remaining, sessile. Abdominal carcinomatosis with ascites occurred in 15% of all rats with tumors. In a second experiment 10 rats received dimethylhydrazine (18 mg/kg), 10 received azomethane (8 mg/kg), and 10 received methylazoxymethanol (6 mg/kg), s.c./week. Only 60% of the rats receiving methylazoxymethanol developed tumors. A second group of 30 rats was similarly treated with the addition of cholestyramine in the amount of 2% added to their diet. In the 10 rats fed dimethylhydrazine, 48 tumors developed; cholestyramine in their diet increased the yield to 76, with the increase occurring largely in the large intestine, especially the distal half. Cholestyramine increased the tumor yield from 68 to 135 in azoxymethane-fed rats and from 14 to 40 in rats receiving methylazoxymethanol. Tumors in cholestyramine-fed rats were larger and the vast majority were sessile, appearing more like human colonic cancer. Rats receiving 2% cholestyramine suffered moderate but not incapacitating steatorrhea. It is concluded that the rat receiving azoxymethane, s.c., at weekly intervals while on a 2% cholestyramine diet is an excellent experimental model for studies of human colonic cancer.

1365 PREOPERATIVE PREPARATION OF THE COLON WITH AN ELEMENTAL DIET.

(E.) Glotzer, D. J.; Boyle, P. L.; Silen, W. (Harvard Med. Sch., Boston, Mass.). *Surgery* 74(5):703-707, 1973.

Vivonex was used in preparation of the colon for operation in 9 patients with particular attention given to its effect on fecal flora. The patients were scheduled to undergo colonic operations for lesions requiring resection and anastomosis or combined abdominal perineal resection. There was a progressive reduction in the dry weight of the stools and preparation was judged satisfactory to excellent in each instance by the operating surgeons. However, there was no change in the types or levels of aerobic or anaerobic fecal bacteria during the period of the study. The pH of the stools of these patients was measured, suspecting that acidification of the stool might result in reduction of fecal flora, but the pH remained stable. Thus results of this study indicated that the diet has merit as an aid in mechanical preparation of the colon while presumably maintaining nutrition, but does not, by itself, reduce or simplify the fecal bacteria.

1366 MUCOSAL HYPERPLASIA, MUCINOUS CYSTADENOMA, AND MUCINOUS CYSTADENOCARCINOMA OF THE APPENDIX. A RE-EVALUATION OF APPENDICEAL "MUCOCELE".

(E.) Higa, E.; Rosai, J.; Pizzimbono, C. A., Wise, L. (Barnes Hosp., St. Louis, Mo.). *Cancer* 32(6):1525-1541, 1973.

Appendiceal lesions (73) fulfilling the criteria of so-called mucocele were evaluated and classified as 1 of 3 distinct clinicopathologic entities: focal or diffuse mucosal hyperplasia, mucinous cystadenoma, or mucinous cystadenocarcinoma. The microscopic pattern in the 18 cases of focal or diffuse mucosal hyperplasia with no epithelial atypia and mild distention of the lumen is highly reminiscent of the colonic hyperplastic polyp. This is a benign lesion, almost always a pathologic finding in appendices removed incidentally. Of the 18 cases, 5 were associated with adenocarcinoma of the large bowel, and 1 with ovarian mucinous cystoma. The 46 cases of mucinous cystadenoma exhibited some degree of epithelial atypia and marked distention of the lumen. Of these 46, 4 were associated with ovarian mucinous cystoma and 9 with adenocarcinoma of the large bowel. In 10 cases, variable amounts of a cellular mucus were present in the periappendiceal region and occasionally free in the peritoneal cavity. In 3 of these cases, the mucus probably originated from

coexistent ovarian tumor. Of the followed patients,
one died as a consequence of appendiceal cystadenoma.
imple excision of the lesion was curative in every
ase. The 9 cases of mucinous cystadenocarcinoma
ere distinguished from the previous 46 cases by the
resence of stromal invasion by glands and/or epi-
helial cells in the peritoneal implants. Peritoneal
nvolvement (*pseudomyxoma peritonei*) was present in
In 2 others the lesion was limited to the append-
, and in the remainder there was direct extension
nto the urinary bladder. Of the 6 patients with
eritoneal extension, 4 died as a result of the di-
ease 2-11 yr after the original surgery, 1 was lost
follow-up, and the 6th is a recent observation.
e 2 patients with localized tumor were alive and
ll 2 and 19 yr after treatment. The patient with
rect extension into the urinary bladder was alive
d well 7 yr after an anterior pelvic exenteration.
the basis of these findings, it is suggested that
st instances of so-called mucocele be regarded as
cinous neoplasms, analogous in many aspects to epi-
elial tumors of the colon, with peculiarities prob-
ly due to the anatomical characteristics of the
gan in which they arise.

67 THE VALUE OF BARIUM-ENEMA STUDIES IN PATIENTS WITH CARCINOMA OF THE RECTUM.

.) Jensen, H. E.; Balslev, I.; Kragelund, E.;
elsen, J. (Kommune Hosp., Copenhagen, Denmark).
s. Colon Rectum 16(6):482-484, 1973.

rium-enema studies of the colon undertaken in
007 patients with carcinoma of the rectum failed
demonstrate the rectal tumor in 16% of the cases,
d failed to demonstrate coincidental tumors of the
lon in 63% of patients with such tumors. Addi-
onally there was a 0.25% incidence of false-positive
ndings in the colon. Barium studies must be under-
ken in cases of coincidental ulcerative colitis
familial polyposis to determine the extent of
ese conditions. However, it is suggested that the
rium-enema studies of the colon in patients with
rcinoma of the rectum confirmed by palpation or
octoscopy need no longer be performed. Thus, the
rgeon is very aware of the importance of his pre-
erative palpation, which has proved to be very
ch more reliable for detecting coincidental tumors
the colon than preoperative barium-enema studies.

68 AN ELECTRON MICROSCOPE STUDY OF THE AUERBACH'S PLEXUS AND DETERMINATION OF SUB-
ANCE P OF THE COLON IN HIRSCHSPRUNG'S DISEASE.

) Tafuri, W. L.; Maria, T. A.; Pittella, J. E.
Bogliolo, L.; Hial, W.; Diniz, C. R. (Fac. de
. U.F.M.G., Belo Horizonte, Brazil). *Virchows
h. (Pathol. Anat.)* 362(1):41-50, 1974.

electron microscopic study of the Auerbach's
xus and determination of substance P of the
on was presented for 3 cases of Hirschsprung's
ease. In the 3 cases studied, isolated Auer-
h's ganglia showed, under optical microscopy,
be normal and displayed voluminous neurons and
ve fibers with enlarged caliber. The lesions
t frequently observed in the neuron body were:
tial, focal or, diffuse tigrolysis; tumefaction, partial or total cristolysis, and lysis of the mitochondria matrix; enlargement of the cisternae of the endoplasmic reticulum; and presence of numerous liposomes and lysosomes and eventual loss of the whole architecture. All nerve fibers were unmyelinated. They were always filled with vesicular components, dense granular vesicles, as well as intermediary and clear ones. No great alterations were observed in the Schwann cells. Their cytoplasm looked developed and presented well-individualized gliofilaments. The extrinsic nerve fibers of the distal portion were seen in bundles, the fibers were disorderly, followed various directions and showed an increase in thickness and enveloped in a sheath of connective tissue. There was a significant increase of substance P in the dilated part of the colon as compared with that in the narrowed segment. It is concluded that substance P, which is always found in larger amounts in the ganglionic portion of the colon (than in the aganglionic one), may be related with the granular vesicles of Auerbach's plexus.

1369 THE BEHAVIOUR OF CARCINOMA OF THE LARGE BOWEL IN MAN FOLLOWING TRANSPLANTATION INTO IMMUNE DEPRIVED MICE.

(E.) Cobb, L. M. (Roy. Cancer Hosp., London, England). *Brit. J. Cancer* 28(5):400-411, 1973.

The growth of carcinoma of the human large bowel was studied in the first 2 passages in immune deprived mice. Male and female CBA/lac mice were thymectomized at 4 weeks of age and were given 900 rad whole body irradiation at 8 weeks. Irradiation was given at 60 rad/min using a 220 kV x-ray machine h.v.l. 0.4 mm^3, focal distance 100 cm. This dose of radiation would have been lethal without a bone marrow graft. Within 6 hr of irradiation, each animal received 5×10^6 syngeneic femoral bone marrow cells, i.v. The animals received the tumor graft between 2 and 4 weeks after irradiation. Tumors were obtained from large bowel resections on 3 people. A strong histological similarity between the patient's tumor and that which grew in the mice 2-8 months after implantation was noted. One dissimilarity was a higher mitotic index in some of the tumors in the immune deprived animals. In the second passage of bowel tumors, cells were implanted into groups of 8-10 animals in the following sites: subcutaneous, intramuscular, intravenous, intrahepatic, intraperitoneal, and intrathoracic. Tumor growth was observed from all 3 tumors when they were implanted subcutaneously, intramuscularly, intraperitoneally, and intrathoracically. Infiltration of muscle by tumor was a frequent finding. Lung metastases developed after injection of cells in 1 of 3 tumors. In none did growth follow injection of cells directly into the substance of the liver. Spontaneous metastasis was not observed.

1370 GARDNER'S SYNDROME.

(E.) Alm, T.; Dencker, H.; Lunderquist, A.; Mark, J.; Mitelman, F.; Norryd, C.; Tranberg, K. (Dept. Surg., Univ. Lund, Sweden). *Acta Chir. Scand.* 139(7):660-665, 1973.

Seven cases of Gardner's syndrome in one family are presented and discussed. Among these, 2 children, 7 and 8 years old, were found to be affected. The extracolonic manifestations were roentgenographically demonstrated small osteomas in 3 cases, and a desmoid arising *de novo* in one. Five patients had not sought medical advice, but their names were on a central register for control of polyposis families and they were invited to the hospital for an examination. So far, 4 of the patients have undergone colectomy and 3 had multifocal carcinoma. Relatives of patients with Gardner's syndrome and familial colonic polyposis should be subjected to roentgen examination of the colon. Skeletal X-rays should also be performed and the patients carefully examined for subcutaneous tumors since growths in these sites may be the first objective signs of Gardner's syndrome.

1371 THE ACTIVITY OF PHOSPHOFRUCTOKINASE AND LACTATE DEHYDROGENASE IN CANCER OF THE COLON AND RECTUM AND THE EFFECT OF IODINE ON THE NORMAL MUCOSA. *(E.)* Briand, P.; Fischerman, K. (Rigshosp., Copenhagen, Denmark). *Acta Chir. Scand.* 139(7):666-670, 1973.

Phosphofructokinase and lactate dehydrogenase activities were assayed in malignant tumors of the colon or rectum of 15 patients. The average tumor value of phosphofructokinase was about 50% higher, and of lactate dehydrogenase, about 100% higher than in the histologically noninvolved mucous membrane of the same organ. Based on paired observations, these increases are highly significant. In a few cases, the enzyme values of adjacent noninvolved tissue were at tumor level. It is suggested that this indicates very early neoplastic (premalignant) changes. Application of relatively high iodine concentrations (but not high enough to interfere with the healing processes in test animals) to the colon mucosa of man, pig, and dog markedly decreased the in vitro tissue enzyme activity. It is concluded that the tumor cells dislodged to the iodine-treated areas may be growth-inhibited.

1372 COLON PERFORATIONS ASSOCIATED WITH STEROID THERAPY. *(E.)* Sterioff, S.; Orringer, M. B.; Cameron, J. L. (Baltimore City Hosp., Md.). *Surgery* 75(1):56-58, 1974.

Colon perforations associated with steroid therapy were studied in 10 patients. All patients were on oral prednisone for a variety of underlying illnesses. The dose ranged from 10 to 80 mg/day with a mean of 20 mg/day. The duration of medication ranged from 5 days to 6 yr with a mean of 10 months. The underlying diseases were: disseminated lupus erythematosis; postrenal transplant; postbone-marrow transplant for acute monocytic leukemia; emphysema and bronchial asthma; and rheumatoid arthritis. In 8 patients there was some delay in the diagnosis of the colon perforation. Fever and abdominal tenderness were present in almost all patients. Leukocytosis and rebound tenderness were often absent. In only 2 patients was an unequivocal diagnosis made of a perforated viscus by the consulting surgeon on initial physical examination. Eight patients had perforated diverticula, all in the rectosigmoid. Two patients had a vasculitis involving the transverse colon with necrosis, ulceration, and perforation. Only 3 of the 10 patients survived. All 3 survivors had walled off the perforation prior to presentation and a well-defined abscess was demonstrated by barium enema. It is concluded that clinical recognition will be aided by remembering that in any steroid-treated patient with fever and abdominal symptoms, the colon should be suspect.

1373 DIETARY HYPOTHESES AND DIET-RELATED RESEARCH IN THE ETIOLOGY OF COLON CANCER. *(E.)* Berg, J. W.; Howell, M. A.; Silverman, S.J. (Natl. Cancer Inst., Natl. Inst. Hlth., Bethesda, Md.). *Health Serv. Rep.* 88(10):915-924, 1973.

1374 CANCER OF THE LARGE INTESTINE: EPIDEMIOLOGIC FINDINGS. *(E.)* Haenszel, W.; Correa, P. (Natl. Cancer Inst., Natl. Inst. Hlth., Bethesda, Md.). *Dis. Colon Rectum* 16(5):371-377, 1973.

1375 STENOSIS OF THE COLON DUE TO PANCREATITIS AND MIMICKING CARCINOMA. *(E.)* Hancock, R. J.; Christensen, R. M.; Osler, T. R.; Cassim, M. M. (Vancouver Gen. Hosp., Canada). *Can. J. Surg.* 16(6):393-398, 1973.

1376 CLASSIFICATION OF NEUROMAS OF THE APPENDIX. *(E.)* Michalany, J.; Galindo, W. (Paulist Sch. Med., Sao Paulo, Brazil). *Beitr. Pathol.* 150(3):213-228, 1973.

1377 OUR EXPERIENCE OF SURGICAL TREATMENT OF DIVERTICULAR DISEASE OF THE COLON IN THE LIGHT OF RECENT PHYSIOPATHOLOGICAL FINDINGS. *(It.)* Speranza, V.; Simi, M. (Inst. Anat. Surg., Rome, Italy). *Chir. Gastroenterol.* 7(2):167-182, 1973.

1378 HEREDITARY ADENOMATOSES OF THE LARGE INTESTINE. *(Ger.)* Hassan, A.; Wedell, J. (Med. Fac., Technological Coll., Aachen, Germany). *Dtsch. Med. Wochenschr.* 98(45):2150-2153, 1973.

1379 RETROPERITONEAL EMPHYSEMA AFTER COLONOSCOPY *(E.)* Lezek, M. B.; Goldhamer, M. (VA Hosp., San Diego, Calif.). *Gastroenterology* 66(1):118-120, 1974.

1380 SURGICAL TREATMENT OF COLON PRECANCERS. *(Ger.)* Deucher, F.; Streuli, H. K. (Cantonal Hosp., Aarau, Switzerland). *Helv. Chir. Acta* 40(5/6):609-619, 1973.

1381 SOLITARY SIGMOID NEUROFIBROMA IN A CHILD. *(Ger.)* Morger, R. (Eastern Switzerland Hosp. Infants Children, St. Gallen). *Helv. Chir. Acta* 40(5/6):731-733, 1973.

32 DETECTION AND PREVENTION OF RECTOSIGMOID
CANCER IN DAILY PRACTICE. *(Fr.)* Muller,
A. (no affil.). *Helv. Chir. Acta* 40(5/6):751-754,
73.

33 RECTITIS. *(Fr.)* Chabanon, R. (no affil.).
J. Med. Lyon 54(1251):923-926, 1973.

34 SEGMENTAL DILATATION OF THE COLON. *(E.)*
Brawner, J.; Shafer, A. D. (no affil.).
Pediatr. Surg. 8(6):957, 1973.

5 PATHOGENESIS OF POLYPOSIS OF THE LARGE
INTESTINE. *(Rus.)* Malyshev, Iu. I.;
orkin, E. N.; Pyt'eva, G. P.; Rusakov, V. M.
I. Ul'ianov Med. Inst., Kuibyshev, USSR). *Kazan.*
. Zh. (5):15-18, 1973.

6 COLONOSCOPIC POLYPECTOMIES. *(E.)* Spencern,
R. J.; Coates, H. L.; Anderson, Jr., M.
(Mayo Clin., Rochester, Minn.). *Mayo Clin. Proc.*
1):40-43, 1974.

7 GINGIVAL RECESSION ("GETTING LONG IN THE
TOOTH"). COLORECTAL CANCER. DEGENERATIVE
MALIGNANT CHANGES AS ERRORS OF GROWTH-CONTROL.
) Burch, O. R. J.; Jackson, D.; Fairpo, C. G.;
ray, J. J. (Dept. Med. Phys., Univ. Leeds,
land). *Mechanisms Aging Devel.* 2(4/5):251-273,
3.

1388 TRANSIT TIME IN PATIENTS WITH SPASTIC COLON AND DIVERTICULOSIS. *(Sp.)* Mate Jiminez, J.; Pajares Garcia, J. M. (Gran Hosp. Estado, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(1):59-62, 1973.

1389 TREATMENT OF "IRRITABLE COLON". *(Fr.)* Demole, M. J. (Univ. Cantonal Hosp., Geneva, Switzerland). *Rev. Fr. Gastroenterol.* (86):5-8, 1973.

1390 THE PREVENTION OF ANASTOMOTIC LEAKS IN EXPERIMENTAL DIVERTICULITIS. *(E.)* Bartkovich, J.; Butterfield, W. C. (Syracuse Med. Ctr., N.Y.). *Rev. Surg.* 31(1):7-10, 1974.

1391 PARARECTAL ENTEROID CYST. *(Fr.)* Roux, M.; Delavierre, P.; Vayre, P.; Debbasch, L.; Teisseire, J. (Vaugirard Hosp., Paris, France). *Sem. Hop. Paris* 49(28):2071-2073, 1973.

1392 RADIOISOTOPE LYMPHOGRAPHY IN THE DIAGNOSIS OF METASTASES IN PATIENTS WITH CARCINOMAS OF THE COLON AND RECTUM. *(Rus.)* Adamian, A. A.; Galstian, A. M. (Armenian Inst. Roentgenol. Oncol., USSR). *Zh. Eksp. Klin. Med.* 12(2):67-70, 1972.

See also, 0892, 1111, 1151, 1153, 1154, 1159, 1169, 1177, 1178, 1183, 1200, 1211, 1217, 1228, 1286, 1318, 1322, 1328, 1332, 1336, 1337, 1339, 1582, 1605, 1606.

LARGE INTESTINE

Ulcerative Colitis

3 ELECTRICAL POTENTIAL DIFFERENCE AND SODIUM
AND POTASSIUM FLUXES ACROSS RECTAL MUCOSA
ULCERATIVE COLITIS. *(E.)* Edmonds, C. J.; Pil-
r, D. (Univ. Coll. Hosp. Med. Sch., London,
land). *Gut* 14(10):784-789, 1973.

transmucosal electrical potential difference and
sodium and potassium flux rates have been mea-
ed in the rectum and distal sigmoid colon of 8
ients with ulcerative colitis and compared with
surements made in individuals having normal bowel
ction. In active colitis, a very low transmucosal
ential difference was found and was associated
h loss of the characteristic ability of the mucosa
absorb sodium against considerable electrochemical
dients; a marked increase in the plasma-to-lumen
ium flux rate, suggesting increased leakiness of
mucosa; and loss of the active sodium absorption
hanism. In resolving colitis, the potential dif-
ence was higher and all these changes of sodium
nsport tended to return toward normal. With full recovery, epithelial function was normal to the present tests. Potassium secretion rate showed little difference at various stages of the disease, but the nearly normal secretion of potassium in ulcerative colitis when the potential difference was low suggested that potassium loss to the lumen was excessive. Mucus collected from patients with ulcerative colitis had a relatively high sodium and potassium content. Measurement of potential difference and absorption by using a dialysis tube offers a simple means of rapid assessment of mucosal functional integrity.

1394 LYMPHOBLASTIC RESPONSE TO AUTOLOGOUS COLON EPITHELIAL CELLS IN ULCERATIVE COLITIS IN VITRO. *(E.)* Hunt, P. S.; Trotter, S. (Dept. Surg., Monash Univ., Melbourne, Australia). *Gut* 14(11):875-879, 1973.

The blastic transformation *in vitro* of peripheral blood lymphocytes was measured by the 72 hr uptake of ^{3}H-6-thymidine in 23 patients with mucosal ulcerative colitis, 3 with acute Crohn's colitis with rectal involvement, and 7 normal subjects, all aged 19-62 yr. The 23 patients with ulcerative colitis were divided into 3 groups graded according to severity as acute, severe (7); active, chronic (9); and quiescent disease (7). In the control cultures of lymphocytes without any added potential stimulant the uptake of ^{3}H-6-thymidine in the clinical subgroup of 7 patients with acute, severe ulcerative colitis was significantly greater than in 7 normal subjects. This contrasted with a reduced uptake of tritiated thymidine by lymphocytes from the acute severe colitis patients when compared with 7 normal subjects after stimulation with phytohemagglutinin-P. In further duplicate cultures of lymphocytes specifically stimulated by an equal number of viable autologous rectal epithelial cells, the uptake of tritiated thymidine was significantly greater in 7 acute severe colitis patients when compared with 7 normal subjects. The results in 3 patients with acute Crohn's colitis with rectal involvement showed no such evidence of lymphocyte sensitivity to autologous rectal epithelial cells and their uptake of tritiated thymidine was normal. Results obtained in the unstimulated and epithelial cell stimulant cultures gave evidence that the degree of lymphoblastic transformation was related to the clinical severity of ulcerative colitis. The uptake of ^{3}H-6-thymidine was directly related to the clinical severity of ulcerative colitis in the 3 subgroups studied. In addition, of the 7 patients with acute severe colitis, 4 were studied later in clinical remission and had significantly reduced uptake of tritiated thymidine in response to autologous rectal epithelial cells.

1395 SOME PROBLEMS OF SURGICAL TREATMENT OF NONSPECIFIC ULCERATIVE COLITIS. *(E.)* Yudin, I. Y. (Inst. Exp. Clin. Oncol., Acad. Med. Sci., Moscow, USSR). *Am. J. Proctol.* 24(5):403-405, 1973.

1396 THE MANAGEMENT OF ULCERATIVE COLITIS. *(E.)* Truelove, S. C. (Radcliffe Infirm., Oxford, England). *Br. J. Clin. Pract.* 28(1):5-10, 1974.

1397 ULCERATIVE COLITIS: SURGICAL INDICATIONS FOR IT. *(Sp.)* Fernandez Montero, F. (San Juan de Dios Hosp., Jaen, Spain). *Hispalis Med.* 30(349):623-642, 1973.

1398 NEW METHODOLOGICAL DEVELOPMENTS IN OUT-PATIENT TREATMENT FOR PATIENTS WITH NON-SPECIFIC ULCERATIVE COLITIS. I. *(Rus.)* Shakhbazian A. A. (no affil.). *Zh. Eksp. Klin. Med.* 13(1):71-75, 1973.

See also, 1154, 1160, 1357, 1361.

PANCREAS

1399 RADIATION THERAPY IN THE TREATMENT OF IRRESECTABLE ADENOCARCINOMA OF THE PANCREAS. *(E.)* Haslam, J. B.; Cavanaugh, P. J.; Stroup, S. L. (Duke Univ. Med. Ctr., Durham, N. C.). *Cancer* 32(6):1341-1345, 1973.

Irresectable adenocarcinoma of the pancreas in 29 patients (18 males and 11 females, aged 40-77 yr) was treated with radiotherapy between the years 1961 and 1971. In 6 patients the tumor was widespread. Regional malignancy occurred in 23 patients and these were treated with curative intent. Some patients received adjunctive chemotherapy with 5-fluorouracil (13 patients), cyclophosphamide (1), or amethopterin (1). The radiotherapeutic technique used in 23 cases when cure was thought possible consisted of 6000 R calculated at the frontal midplane (anterior-posterior diameter) of the pancreas region, using Cobalt 60, in 10 weeks elapsed time. Three series of 2000 R in 10 fractions (2 weeks) were given, spaced by intervals of 2 weeks. The crude survival figure was 21% at 2 1/2 yr following diagnosis for all 29 patients. The morbidity of treatment was low; palliative results were encouraging. These results suggest an advantage of high-dose split-course megavoltage irradiation in localized irresectable adenocarcinoma of the pancreas. It is felt that patients unable to complete the radiotherapy course were victims of unyielding tumor rather than adverse effects of treatment.

1400 INTRAJEJUNAL ADMINISTRATION OF AN ELEMENTAL DIET AT NEUTRAL pH AVOIDS PANCREATIC STIMULATION. STUDIES IN DOG AND MAN. *(E.)* Ragins, H.; Levenson, S. M.; Signer, R.; Stamford, W.; Seifter, E. (Albert Einstein Coll., Med., Bronx, N.Y.). *Am. J. Surg.* 127(4):606-614, 1973.

An elemental diet (Vivonex 100) stimulated pancreatic secretion when instilled into the

tomach of dogs. When Vivonex 100 at pH 5.4
as perfused through a hir-Vella loop, pan-
reatic secretion was not stimulated signifi-
antly, although the bicarbonate output did
ncrease significantly. A mixture of essential
nd nonessential amino acids and a mixture of
henylalanine, leucine, and tryptophan, when
erfused through a Thiry-Vella loop at pH
.0 and in the concentration present in Vivonex
00, caused minimal stimulation of pancreatic
ecretion. When the same amino acid mixtures
cidified to a pH of 3.5 were perfused through
Thiry-Vella loop, stong pancreatic secretion
ccurred. Perfusion of hypertonic glucose
olution (22.6%) in a Thiry-Vella loop inhibited
rotein and bicarbonate output from the pancreas.
hen 22.6% glucose solution was introduced
nto the stomach, pancreatic secretion was stimu-
ated. When amino acid mixtures in the con-
entration present in Vivonex 100 were instilled
nto the stomach, strong stimulation of pan-
reatic secretion resulted. These results
phasize the importance of bypassing the stomach
d minimizing acid secretion to keep the pan-
reas at rest. Measurements of net absorption
om the Thiry-Villa loop suggest that sodium
loride enhances glucose absorption. Hyper-
nic glucose appears to inhibit amino acid
sorption from a jejunal loop. It is suggested
at separation of the amino acids and the
ucose for intrajejunal feedings may improve
e absorption of amino acids. This may be of
rticular importance in feeding elemental diets
patients with the short bowel syndrome.

01 ECHOGRAPHY B COMBINED WITH SCINTIGRAPHY IN THE DIAGNOSIS OF PANCREATIC DISEASE.
r.) Murat, J.; Chenille, E.; Floyrac, G.; Garnier,
; Crassas, Y.; Planiol, T.; Aron, E. (Bretonneau
iv. Hosp. Ctr., Tours, France). *Arch. Fr. Mal.*
p. Dig. 62(6):449-463, 1973.

e results of pancreatic echography and differential
ncreatic and hepatic scintigraphy were compared
th those of clinical and conventional radiological
thods (hypotonic duodenography, intravenous cholan-
ography, and celiac arteriography) in 15 patients
men and 6 women, aged 37-82 yr) with symptoms
ferable to the pancreas. Jaundice was present in
cases. Pancreatic disease was confirmed at sur-
ry in 10 patients and consisted of pancreatitis
cases) and cancer of the pancreas (2 cases). The remaining 5 patients had gallbladder cancer (1), tumor of the ampulla of Vater (1), cholelithiasis with an abscess of the gallbladder (1), celiac disease (1), and a juxtapancreatic calcifying adenopathy (1). By combining echography and scintigraphy, a correct diagnosis of the state of the pancreas was obtained in 14 of the 15 patients. The clinical diagnosis was incorrect in 6 cases, and conventional radiological diagnosis was incorrect in 7. It is recommended that a combination of echography and scintigraphy be used to confirm that the pancreas is normal, to confirm a diagnosis of chronic or acute pancreatitis, and to demonstrate the presence of cancer of the pancreas. This method is also of value in diagnosing small pseudocysts although the conventional radiological methods usually suffice in the diagnosis of large pseudocysts.

1402 CYSTADENOCARCINOMA OF THE HEAD OF THE PANCREAS REVEALED BY DUODENAL STENOSIS. REPORT OF A CASE TREATED BY CEPHALIC DUODENOPANCREATECTOMY. *(Fr.)* Lefaucher, C. (Central Hosp., Mezieres-Charleville, France). *Chirurgie* 99(7):466-469, 1973.

1403 AN EPIDEMIOLOGIC STUDY ON PANCREATIC CANCER WITH SPECIAL REFERENCE TO U.S.-JAPANESE COMPARISON. *(Jap.)* Maruchi, N. (Fac. Med., Univ. Tokyo, Japan). *Jap. J. Cancer Clin.* 19(2):73-81, 1973.

1404 CLINICAL FEATURES AND DIAGNOSIS OF PANCREATIC CANCER. *(Rus.)* Fedorova, O. D.; Goriacheva, P. I. (no affil.). *Kazan. Med. Zh.* (5):10-12, 1973.

1405 CLOSED ABDOMINAL TRAUMA AND ISOLATED RUPTURE OF THE PANCREAS. *(Sp.)* Toledo Trujillo, M.; Gomez Alonso, A.; Garcia Santos, J. (La Laguna Univ., Fac. Med., Canary Islands). *Rev. Esp. Enferm. Apar. Dig.* 41(2):177-190, 1973.

See also, 1144, 1156, 1158, 1179, 1199, 1206, 1207, 1256, 1347, 1414.

PANCREAS

Pancreatitis

06 ANTIBODY RESPONSE IN PATIENTS WITH ACUTE PANCREATITIS TO MYCOPLASMA PNEUMONIAE.
) Leinikki, P.; Pantzar, P.; Tykka, H. (Dept.
ol., Univ. Helsinki, Finland). *Scand. J. Gastro-*
erol. 8(7):631-635, 1973.

Paired sera from 56 patients with acute pancreatitis were studied to detect signs of viral or mycoplasma infection during the illness. In 18 patients a significant increase in titres with chloroform-extracted Mycoplasma pneumonia antigen could be demonstrated. In 28 patients constant or negative titres were observed, and 10 had variable results from test to test. The clinical picture of pancreatitis was similar in both mycoplasma pneumonia-positive and negative groups. The absence of epidemiological fluctuation in the incidence of acute pancreatitis, and the absence of respiratory illness in these patients rebut the hypothesis that mycoplasma pneumonia antigen would play an essential role in the disease. The lack of very high complement fixation-titres and the variable behavior in some of the sera would rather suggest an antigenic stimulus by some related mycoplasma or tissue component of pancreatic origin.

1407 ACUTE PANCREATITIS IN PATIENTS WITH ACUTE HEPATIC FAILURE. *(E.)* Ham, J. M.; Fitzpatrick, P. (Prince Henry Hosp., Little Bay, Australia). *Am. J. Dig. Dis.* 18(12):1079-1084, 1973.

The incidence of acute pancreatitis was studied in 42 patients with acute liver failure, the majority due to short-incubation hepatitis. The diagnosis of pancreatitis was based on autopsy findings, and classified as severe, moderate, or mild. Fourteen patients (33%) had evidence of pancreatitis: severe in 4, moderate in 5, and mild in 5. It is suggested that this pancreatitis was due either to the virus causing infectious hepatitis or to the blood coagulation changes accompanying acute liver failure. Acute pancreatitis should be considered as one of the possible causes of sudden clinical deterioration in patients with acute liver failure.

1408 SERUM IMMUNOGLOBULINS IN CALCIFIC PANCREATITIS. *(E.)* Bank, S.; Novis, B. H.; Petersen, E.; Dowdle, E.; Marks, I. N. (Groote Schuur Hosp., Cape Town, South Africa). *Gut* 14(9):723-725, 1973.

Serum immunoglobulin concentrations were measured in 40 patients with calcific pancreatitis. A significant elevation was found of the mean serum IgA and IgG concentration when compared with a control group. The IgA was raised in 50% and the IgG in 27.5% when the individual results were assessed. The IgA did not appear to be of the secretory type. The raised immunoglobulin levels appeared to be related to the pancreatic disease and not to the presence of extrapancreatic infection, activity of the disease, or the presence of pancreatic diabetes or steatorrhoea. It is conceivable that the elevated IgA and IgG levels reflect, in a poorly understood, nonspecific manner, the presence of chronic inflammation in the pancreas. The high immunoglobulin levels may be related to autoimmune processes in the pancreas once the disease is established and may contribute to the progressive nature of the disease.

1409 THE DIAGNOSTIC VALUE OF ORAL GLUCOSE TOLERANCE TEST AND COMBINED B-CELL STIMULATION IN CHRONIC PANCREATITIS. *(E.)* Grabner, W.; Phillip, J.; Strigl, P. (Dept. Med., Univ. of Erlangen/Nurenberg, West Germany). *Am. J. Dig. Dis.* 18(12):1055-1060, 1973.

The secretory capacity of the B-cells in 40 patients with chronic or chronic relapsing pancreatitis was examined by means of the oral glucose tolerance test (100 g of glucose, orally) and combined stimulation (100 g of glucose, orally, 1 mg of glucagon, and 0.5 g of tolbutamide intravenously. The patients with chronic or chronic relapsing pancreatitis showe distinctly decreased insulin values. The simultaneously determined blood glucose concentrations were increased at every point of the test in all patients The immunologically measurable insulin was significantly reduced, when compared with the controls. The maximal insulin differences and the insulinogeni index (35-minute value) of the combined stimulation method were most satisfactory for the diagnosis of the secretory B-cell insufficiency. In addition to these parameters, the constancy of insulin levels i the period between 35 and 60 minutes indicated a dysfunction of the endocrine pancreas.

1410 PLASMA LEVELS OF ELASTASE, TRYPSIN AND THEIR INHIBITORS IN BILE INDUCED PANCREATITIS IN THE DOG. *(E.)* Satake, K.; Reichman, J.; Carballo, J.; Appert, H. E.; Howard, J. M. (Hahnemann Med. Coll., Philadelphia, Pa.). *Ann. Surg.* 179(1):58-61, 1974.

The levels of several pancreatic enzymes were measured serially in the plasma and lymph of 15 mongrel dogs for 5 hr following bile induced-pancreatitis. Plasma amylase, lipase, trypsinogen, and trypsin levels rose during the 5-hr-period after pancreatitis. Plasma total elastase levels decreased to les than half of control values. Free elastase levels in the femoral and portal veins rose slightly in the 1st hr after which they returned to normal. Th decrease in elastase may be partially explained by a decreased liberation of unbound elastase by the pancreas. Since the portal vein levels of elastase inhibitor increased, increased output of elastase inhibitor may also partially account for the drop i circulating elastase observed following the inducti of pancreatitis. In contrast to elastase inhibitor trypsin inhibitor decreased in the portal vein whil the trypsin inhibitor in the systemic circulation appeared to increase slightly. These differences suggest that trypsin inhibitor is produced in the liver and elastase inhibitor by the pancreas or som other extrahepatic abdominal organ.

1411 UPTAKE AND INCORPORATION OF AMINO ACIDS BY RAT PANCREAS IN VITRO DURING ACUTE, EXPERIMENTAL PANCREATITIS. *(E.)* Machovich, R.; Szikla, K. (Inst. Med. Chem., Semmelweis Univ. of Med., Budapest, Hungary). *Enzyme* 14(6):372-377, 1973.

The uptake of amino acids by pancreatic cells *in vitro* and their incorporation into proteins were examined 24 hr after induction of acute pancreatiti in male CFE rats. Acute pancreatitis was induced by injecting deoxycholate or physiological saline

olution into the ductus pancreaticus. The pancreas
as removed and minced 24 hr after treatment of ani-
als. Uptake of ^{14}C-valine at 37 C was 505 dpm/mg
ntracellular water in the deoxycholate-treated sam-
les, 543 in the normal samples, and 640 after physio-
ogical saline. The uptake at 0 C was about 50% of
hat at 37 C. Deoxycholate treatment decreased the
apacity for incorporation at 37 C from 63,800 to
,193 dpm/mg protein; saline treatment decreased it
omewhat, to 21,366 dpm/mg protein. Incubation at
C resulted in essentially no incorporation. After
0 min incubation at 37 C, the size of the valine
ool in the normal and in the damaged pancreas was
lmost identical. In pancreas treated with deoxy-
holate, the specific activities of lipase and ATPase
ere low 24 hr following the induction of acute pan-
reatitis. The activity of lipase diminishes from
.066 to 0.011 U/mg protein and that of ATPase, from
400 to 1700 cpm/mg protein. The results thus indi-
ate that acute pancreatitis is associated with a
iminished capacity for protein synthesis. This is
aralleled by a decrease in the specific activity of
ipase and ATPase.

412 ON THE LYSOLECITHIN CONTENT OF THE PANCREAS IN EXPERIMENTAL ACUTE PANCREATITIS.
.) Papp, M.; Breuer, J. H.; Nemeth, E. P.; Fodor,
; Folly, G. (Semmelweis Univ. Med. Sch., Budapest,
ungary). *Gastroenterology* 65(5):778-787, 1973.

l the major phospholipid classes were found in
e pancreas, pancreaticoduodenal lymph, and arterial
ood plasma of 31 anesthetized male, mongrel dogs.
e proportion of lysolecithin was significantly
gher in the pancreaticoduodenal lymph than in the
ncreas; however, its concentration was higher in
e pancreas than in the lymph. Retrograde injec-
on of 3% sodium taurocholate failed to increase
ther the concentration or the proportion of lyso-
cithin in the dog pancreatic tissue, arterial
ood plasma, pancreaticoduodenal venous plasma,
pancreaticoduodenal lymph 30 or 90 min after
jection, although at 90 min extensive pancreatic
crosis and highly elevated lipase activity were
und in pancreaticoduodenal venous plasma. A
xture of activated pancreatic juice containing
solecithin increased both the concentration and the
oportion of lysolecithin in the dog pancreas and
oduced focal pancreatic necrosis in 90 min. In the pancreas of 39 male albino rats, the retrograde injection of 10 mg of trypsin failed to increase the concentration of lysolecithin 90 min after injection, although it produced acute hemorrhagic pancreatitis. These results cast considerable doubt on the validity of the assumption that lysolecithin formed during the enzymatic hydrolysis of lecithin is responsible for pancreatic injury during the early phases of acute experimental pancreatitis which is induced by either bile salt or trypsin.

1413 GLUCAGON FOR THE TREATMENT OF PANCREATITIS. *(Ger.)* Stremmel, W. (Surg. Clin., Univ. Freiburg/Breisgau, Germany). *Munch. Med. Wochenschr.* 116(2):69-70, 1973.

1414 PROBLEMS IN THE DIFFERENTIAL DIAGNOSIS BETWEEN CHRONIC RECURRENT PANCREATITIS AND PANCREATIC CARCINOMA. *(Sp.)* Sans Segarra, M.; Curto Cardus, J. (Principes de Espana Hosp., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(1):75-80, 1973.

1415 ACUTE PANCREATITIS. CONCEPT AND DIAGNOSIS. *(Sp.)* Villar Caso, J. (no affil.). *Rev. Esp. Enferm. Apar. Dig.* 41(3):385-392, 1973.

1416 PANCREATIC CAPSULECTOMY IN THE TREATMENT OF ACUTE PANCREATITIS. *(E.)* Gilorteanu, M. (Brincovenesc Hosp., Bucharest, Romania). *Surgery* 21(12):55-61, 1972.

1417 SECRETORY ACTIVITY OF THE GASTRIC GLANDS AND PROTEIN DIGESTION BY GASTRIC JUICE IN EXPERIMENTAL REFLUX PANCREATITIS. *(Rus.)* Blagovidov, D. F.; Pomel'tsov, A. N.; Shatalov, V. N. (no affil.). *Zh. Eksp. Klin. Med.* 13(1):35-40, 1973.

See also, 0979, 1137, 1146, 1199, 1401, 1550.

LIVER AND BILIARY TRACT

18 BSP IN THE STUDY OF LIVER FUNCTION DURING PREGNANCY. (PRELIMINARY REPORT). *(Sp.)*
ilicoff, R.; Perelstein, G. I.; Gilardoni, A.;
hon, M. (U.A.M.I., Rivadavia, Argentina). *Acta
stroenterol. Latinoam.* 5(2):65-69, 1973.

P clearance, storage, and maximal transport were
termined on 7 pregnant and 12 nonpregnant women with no evidence of hepatobiliary disease and on 5 pregnant women with pruritis and/or cholestasis. Values for BSP storage were higher and those for maximal transport were lower in normal pregnant women than in nonpregnant controls, but these differences were not statistically significant. An analysis of K_1 and K_2 showed no differences between values for nonpregnant and normal pregnant women.

In pregnant women with pruritis and/or cholestasis significant decreases were found in maximal transport and values for K_1 and K_2. These findings suggest that the uptake and excretion of BSP are impaired in these patients.

1419 HEPATIC GRANULOMATOSIS AND SARCOIDOSIS.

(E.) Israel, H. L.; Goldstein, R. A. (Jefferson Med. Coll., Philadelphia, Pa.). *Ann. Intern. Med.* 79(5):669-678, 1973.

Noncaseating hepatic granulomatosis was present in 30 patients with normal chest roentgenograms. Of these 30, 15 (9 females and 6 males, aged 19-75 yr) had granulomas demonstrated only in the liver, usually by percutaneous biopsies performed due to unexplained fever, fatigue, or abnormal liver function tests. A final diagnosis was possible only in 2 cases, 1 with sarcoidosis and the other with Hodgkin's disease. Most of these 15 recovered spontaneously without treatment. Some had fever persist for many months until corticosteroid therapy was started. Of these 15, 1 died of malignant melanoma and a second of Hodgkin's disease. Kveim tests were negative in 12 of 13 patients so tested. Multisystem granulomatosis was verified in the other 15 patients (8 males and 7 females, aged 13-76 yr). Of these 15, 8 had sarcoidosis and 7, probable sarcoidosis, 1 of whom had Hodgkin's disease. Spontaneous recovery occurred in 2 patients, the other 13 required steroid therapy to control symptoms. Kveim tests were negative in 13 of 14 so tested. All but 2 were tuberculin negative. Granulomas persisted in 1 patient after 18 yr of corticosteroid therapy and after 4 yr of immunosuppressive treatment in another patient. It was concluded that a thorough diagnostic study of patients with hepatic granulomatosis of uncertain cause is necessary. Second-strength tuberculin is reliable in excluding tuberculosis. Trials of antimicrobial therapy are not useful in tuberculin-negative patients. Hodgkin's disease can present a typical sarcoid reaction of the liver, most likely due to concurrent sarcoidosis and lymphoma. Kveim tests are of little value in excluding sarcoidosis. Biopsies from several tissues are needed for accurate diagnosis when the usual thoracic changes are absent.

1420 CIRCULATING TISSUE ANTIGENS. II. STUDIES ON AN ORGAN-SPECIFIC ANTIGEN OF HUMAN LIVER.

(E.) Espinosa, E. (Univ. Louisville Sch. Med., Ky.). *Lab. Invest.* 29(5):556-561, 1973.

A liver-specific antigen detected in serum of certain patients with viral hepatitis was identified in saline extracts of liver tissue from man, rhesus monkey, and dog but was absent in other mammalian species including rodents. Liver-specific antigen was susceptible to digestion by Pronase, was relatively termolabile, was inactivated at acid pH levels, was nonsedimentable at 105,000 x g for 60 min, and was precipitated by 20% ethanol. In immunoelectrophoresis, it had an electrophoretic mobility of serum gamma-globulins. The sedimentation coefficient by sucrose density gradient ultracentrifugation was 6.2S. The molecular radius determined by Sephadex gel filtration was 36.5 A and the diffusion coefficient, 5.7×10^{-7} sq cm/sec. The molecular weight was 82,000 to 93,000, depending on the method used, and the frictional ratio was 1.2. Partial putification from saline extract of human liver was obtained by ethanol precipitation, column chromatography, and gel filtration. Liver-specific antigen has restricted species cross-reactive properties. The relevance of the appearance of this antigen in blood in conditions involving liver damage is currently under study.

1421 PRIMARY HEPATIC TUMORS IN INFANCY AND CHILDHOOD.

(E.) Pollice, L. (Inst. Pathol Anat., Univ. Bari, Italy). *Am. J. Clin. Pathol.* 60:512-521, 1973.

A report of 8 cases involving primary hepatic tumors in infancy and childhood is presented. The children ranged in age from 7 weeks to 15 years old. The presenting symptoms included: palpable painful epigastric mass; palpable painful abdominal mass; palpable abdominal mass; abdominal distention and firmness; loss of weight; abdominal distention; and hepatomegaly. The surgical findings revealed that adenomas, teratomas, and hepatoblastomas were present as a single large mass, while hepatocarcinomas and haemangioendotheliomas manifested as numerous nodules scattered throughout the liver. Four of the 8 children died. The microscopic patterns corresponded to the peculiar features of the tumors. Among the laboratory data, it was remarkable that alpha$_1$ fetoglobulin, an immunoglobulin normally present only in fetal life and found in the sera of most adult patients with hepatocarcinoma, was detected in large amounts in the case of trabecular hepatocarcinoma, while it was not found in the embryonal hepatoblastoma. It is concluded that the most common of primary hepatic tumors in infancy and childhood, hepatoblastomas and infantile hemangioendotheliomas, because of their occurrence early in the life, often in association with congenital malformations, result at least partly from genetic factors and should be included among the dysembryogenetic tumors.

1422 HEPATOCELLULAR CARCINOMA PRESENTING WITH PATHOLOGIC FRACTURE DUE TO BONE METASTASES

(E.) Talerman, A.; Magyar, E. (Inst. of Radiotherap Rotterdam, Netherlands). *Cancer* 32(6):1477-1481, 1973.

Two cases of hepatocellular carcinoma presenting with pathologic fracture due to bone metastases are reported. The patients did not exhibit clinical evidence of liver disease on presentation, and there was no previous history of liver disease. Liver function tests were normal in 1 case, while in the other the only abnormality was a slightly raised alkaline phosphatase. In 1 case the diagnosis was made by needle biopsy of a metastatic bone lesion, and in the other only at autopsy. It is considered

hat hepatocellular carcinoma should be included in
he differential diagnosis of carcinoma metastatic
o bone.

423 VITAMIN E DEFICIENCY IN HUMAN LIVER DISEASE AND ITS RELATION TO HAEMOLYSIS.

E.) Powell, L. W. (Roy. Brisbane Hosp., Australia).
ust. N.Z. J. Med. 3(4):355-360, 1973.

lasma vitamin E levels and *in vitro* and *in vivo*
emolysis were measured in 17 patients with various
orms of liver disease and in 16 control subjects.
itamin E deficiency was demonstrated in patients
ith long-standing obstructive jaundice (presumably
ue to malabsorption from bile salt deficiency) and
as shown to contribute in part to the reduced red
ell survival accompanying this disorder. However,
tamin E deficiency was not the sole cause of the
emolysis since, in contrast to patients with primary
alabsorption, the red cell survival did not return
mpletely to normal following vitamin E administra-
on. Furthermore, in three patients the red cell
rvival was reduced while the plasma vitamin E
vel was within the normal range. Primary hepato-
llular disease without cholestasis was not asso-
ated consistently with vitamin E deficiency and
e red cell survival in these subjects, while fre-
ently abnormal, was not altered by pharmacological
ses of vitamin E. The results indicate that vita-
n E deficiency may result from long-standing ob-
ructive jaundice and that it contributes in part
the reduced red cell survival accompanying this
sorder.

24 SPONTANEOUS RUPTURE OF THE LIVER CAUSED BY HEPATOMAS.

(E.) Hermann, R. E.; David,
E. (Cleveland Clin. Fdn., Ohio). *Surgery*
(5):715-719, 1973.

o cases of spontaneous rupture of the liver, an
common problem, rarely encountered or reported in
e United States are reported. It is caused, in
st cases, by a tumor in the involved hepatic lobe,
st often a hepatocellular carcinoma. One patient,
29-year-old woman, had a hepatocellular carcinoma;
second patient, a 20-year-old woman had a hepato-
llular adenoma. Both patients have had hepatic
ectomies and are alive and well. The incidence,
chanism, and other causes of spontaneous rupture
the liver are reviewed. Hepatic arteriography is
aluable aid in diagnosis and in determining re-
tability. Because of the frequency of hepatoma
the underlying cause of spontaneous rupture of
liver and the difficulty in distinguishing a
ign hepatocellular adenoma from a hepatocellular
cinoma, the recommended treatment for spontaneous
ture of the liver should be as complete a resec-
n of the involved hepatic lobe as possible.

5 GASTRIN IN PORTAL AND PERIPHERAL VENOUS BLOOD AFTER FEEDING IN MAN.

(E.) Dencker,
Hakanson, R.; Liedberg, G.; Norryd, C.; Oscarson,
Rehfeld, J. F.; Stadil, F. (Dept. Surg., Univ.
d, Sweden). *Gut* 14(11):856-860, 1973.

The concentrations of immunoreactive gastrin in serum from portal and peripheral venous blood were determined in 10 patients with indwelling portal catheters before and after feeding. Serum gastrin concentrations were abnormally high in the fasting state in 3 patients. No significant differences were found between the gastrin concentrations in portal and peripheral serum. Feeding induced a rapid increase in serum gastrin in both portal and peripheral blood with a maximum after 15 to 30 minutes, followed by a gradual decrease. Gel filtration studies of serum did not reveal any differences between the gastrin components of portal and peripheral venous serum. Since neither the concentrations of immuno-reactive gastrin nor the four gastrin components differed between portal and peripheral serum it is suggested that the liver is without effect on gastrin metabolism.

1426 ABNORMALITIES IN LIVER FUNCTION TESTS DURING LONG-TERM DIPHENYLHYDANTOIN THERAPY IN EPILEPTIC OUT-PATIENTS.

(E.) Andreasen, P. B.; Lyngbye, J.; Trolle, E. (Univ. Hosp., Copenhagen, Denmark). *Acta Med. Scand.* 194(4):261-264, 1973.

Results in liver function tests were studied in 51 epileptic out-patients on long-term anticonvulsant treatment with diphenylhydantoin (DPH) alone or a combined regimen and compared with a group of 250 control patients. The epileptics had significantly raised serum alkaline phosphatases, serum alanine aminotransferase, and plasma prothrombin time. Serum albumin was significantly decreased, as well as serum calcium and serum bilirubin. In male epileptics significantly raised serum phosphate concentrations were found. There was no significant correlation between the clearance rate of DPH and the liver tests. It is suggested that the inducing effect of DPH and other anticonvulsant drugs may explain the abnormalities in liver function tests and calcium metabolism. The possibility remains, however, that prolonged administration of these drugs to humans may eventually result in liver damage.

1427 SEVERE FAMILIAL INTRAHEPATIC CHOLESTASIS.

(E.) Odievre, M. Gautier, M.; Hadchouel, M.; Alagille, D. (Parrot Hosp., Bicetre, France). *Arch. Dis. Child.* 48(10):806-812, 1973.

Severe familial intrahepatic cholestasis was examined in a series of 5 case studies belonging to 4 different families in which 7 other children have had the same disease. The clinical picture in these 5 children was identical to that of 16 published cases. The cholestatic syndrome was incomplete. Jaundice was of varying intensity, accompanied by dark colored urine and partially acholic stools. Pruritus was generally severe; hepatomegaly was persistent. Bilirubinemia was increased. Injected bromsulphalein was abnormally retained. The total cholesterol and total lipids of the serum remained normal, even when cholestasis lasted several months. Prolongation of cholestasis led to laparotomy to ascertain the permeability of the extrahepatic bile ducts. The liver was enlarged, greenish, regular, or already nodular. Histological examination of the liver in 4 cases showed portal fibrosis with a moderate number of round, inflammatory cells. In 3 of the cases, the first attack of cholestasis occurred before the age of 6 months, in 2 cases between 6 and 10 months. Each attack was related to an intercurrent infection. Each attack lasted from a few days to 20 months. Hepatomegaly was always observed between the attacks. Of the 5 patients, 2 died. In the 4 families, 6 sibs suffering from the disease died before the age of 5, and the seventh at the age of 8.

1428 OPHTHALMOLOGIC AND GENETIC ASPECTS OF WILSON'S DISEASE. (HEPATOLENTICULAR DEGENERATION).

(E.) Karma, A. (Oulu Univ. Eye Hosp., Finland). *Acta Ophthalmol.* 51(3):383-389, 1973.

A study was made of 2 pairs of siblings with Wilson's disease and 44 family members living in the same locality. Ophthalmologic examination as well as determination of serum copper and ceruloplasmin concentrations were performed on all subjects. In the patients with Wilson's disease a liver biopsy specimen was examined by light microscopy. Of the 4 patients, 1 had no physical sign of the disease. In the 3 symptomatic patients the finding of the Kayser-Fleischer ring led to diagnosis. The asymptomatic patient had no such ring. The Kayser-Fleischer ring appears to develop within the months that neurologic symptoms become manifest. The copper ring disappears gradually during penicillamine treatment. The consanguinity of the 2 families was shown by a genealogical study and suggested an autosomal recessive inheritance of the disease.

1429 RADIONUCLIDE STUDIES ON THE GROWTH OF INTRAHEPATIC TUMORS AND OF THE INFILTRATED LIVER.

(E.) Spencer, R. P.; Witek, J. T. (Yale Univ. Sch. of Med., New Haven, Conn.). *Cancer* 32(4):838-842, 1973.

The suggestion is made that radionuclide scans of the liver can be used to measure the rate of growth of intrahepatic neoplasms. Techniques for accomplishing this are discussed, and the linear growth rate (change in diameter/time) is calculated. In 5 cases of metastatic tumors to the liver, the linear growth rate determined by use of the scans is in the range of 100×10^{-3} to 400×10^{-3} mm/day (periods of observation of from 43 to 694 days). In order to compare single intrahepatic tumors with those which infiltrate the liver, there is a need for estimates of tumor and hepatic weights. In 2 cases of diffuse hepatic involvement (carcinoma of stomach, acute lymphatic leukemia) the estimated change in hepatic weight/day is 1.6 and 30.5 grams. Possible uses of the techniques include showing the time course of hepatic involvement, comparing the growth of hepatic and pulmonary lesions before and after therapy, and comparing the observed rates with various growth hypotheses.

1430 ULTRASTRUCTURE OF CYTOPLASMIC HYALINE INCLUSIONS IN A CASE OF HUMAN HEPATOCARCINOMA.

(E.) Enat, R.; Buschmann, R. J.; Chomet, B. (VA West Side Hosp., Chicago, Ill.). *Gastroenterology* 65(5):802-810, 1973.

In recent publications it has been demonstrated that irregular and globular cytoplasmic hyaline inclusions seen by light microscopy in human hepatocarcinoma are non-membrane bound, fibrillar bodies by electron microscopy similar to Mallory bodies. In the case of human hepatocarcinoma which is presented, morphologically similar globular inclusions seen by light microscopy were entirely different by electron microscopy. Ultrastructurally, three types of inclusions are described. Type I inclusions were small (approximately 1 to 4 μm), single membrane-bound, and compactly filled with a rather homogeneous, finely granular matrix containing a small amount of heterogeneous material. Type II inclusions were on the average slightly larger (approximately 2 to 4 μm), were enclosed by a single or double membrane, and contained various organelles either well preserved or in different stages of degeneration, membranous, granular, and/or diffuse debris, and myelin figures. Type III inclusions were relatively large, single membrane-bound vacuoles containing occasional nondescript debris, glycogen rosettes, and membranous profiles. On morphological grounds, the type II inclusions are interpreted as autophagic vacuoles and the type I and III inclusions as developmental stages of the type II. There were no non-membrane bound, fibrillar inclusions of typical alcoholic hyalin. This study emphasizes that the globular cytoplasmic hyaline inclusions of light microscopy need not only be the previously reported non-membrane bound filamentous bodies but can also be autophagic vacuoles.

1431 LECITHIN CHOLESTEROL ACYL-TRANSFERASE AND LIPOPROTEIN-X IN LIVER DISEASE.

(E.) Ritland, S.; Blomhoff, J. P.; Gjone, E. (Univ. Hosp., Oslo, Norway). *Clin. Chim. Acta* 49(2):251-259, 1973.

Determinations of serum lecithin:cholesterol acyl transferase (LCAT) and the "abnormal serum lipoprotein of cholestasis" (LP-X) have been carried out in 52 patients with different liver disorders and in 20 normal subjects. In acute hepatitis reduced LCAT activity was demonstrated in both LP-X positive and LP-X negative patients. In primary biliary cirrhosis and large bile duct obstruction the presence of LP-X was associated with reduced, normal or increased LCAT activity. No specific LCAT/LP-X pattern in liver diseases were revealed; there was no differentiation between intra- and extrahepatic cholestasis on the basis of these two tests. LP-X was demonstrated in all patients with large bile duct obstruction and primary biliary cirrhosis irrespective the LCAT activity. The LCAT activity observed in obstructive liver disease may depend upon the duration of the disease. In longstanding cholestasis secondary injury of the parenchymatous liver cells supervenes and the LCAT activity may be lowered: The findings of normal serum LCAT activity and occurrence of LP-X may support the theory that increased concentration of free cholesterol and lecithin in cholestasis may exceed the capacity of the LCAT enzyme.

1432 α-FETOPROTEIN AND AUSTRALIA ANTIGEN IN PRIMARY LIVER CANCER.

(E.) Dammacco, F.;

iglietta, A.; Antonaci, S.; Bonomo, L. (Univ. Bari
ed. Sch., Italy). *Digestion* 9(1):41-48, 197.

era from patients with neoplastic and non-neoplastic
iseases, as well as from full-term newborns and
regnant women were examined for the presence of α-
etoprotein (α-FP) by counterimmunoelectrophoresis.
-FP was detected in primary hepatoma (59%) and
onadal teratoblastoma. Positive results were also
btained in a case of colonic carcinoma metastatic
o the liver and in 100% of cord blood sera. Since
ounter-immunoelectrophoresis is approximately inter-
ediate between double diffusion and radioimmunoassay
n terms of degree of sensitivity, it was proposed
hat this technique should be employed routinely for
linical purposes. The frequency of the hepatitis-
ssociated antigen (HBAg) was determined in the sera
f hepatoma patients and of two control groups con-
isting of healthy blood donors and patients with
alignant tumors other than hepatoma. HBAg was
resent in 1 (4.5%) of the 22 hepatoma sera. By
omparison, it was detected in 1 (4%) of the 25 sera
elonging to the neoplastic series and in 5 (1.9%)
f 950 blood donors. It is suggested that primary
epatoma is not directly related to chronic hepatitis
nd/or presence of HBAg. When, however, peculiar
elationships occur between host and the hepatitis
irus, viral hepatitis may progress to liver-cell
arcinoma through the intermediate stage of post-
ecrotic cirrhosis.

33 STUDY OF AUSTRALIA ANTIGEN IN PRIMARY
LIVER CANCERS: ITS RELATION TO ALPHA-
TOPROTEIN. *(Fr.)* Bourgeaux, C.; Trepo, C.;
rdes, M.; Sizaret, P.; Martin, F.; Sananes, R.;
petjian, M.; Klepping, C. (Fac. Med., Dijon,
ance). *Biol. Gastroenterol. (Paris)* 6:133-137,
73.

sts for hepatitis B antigen (HBAg) and α-fetoprotein
re performed on sera from 32 patients (31 of French
igin and 1 Algerian) who were suspected of having
imary liver cancer and 13 patients with diseases
her than primary liver cancer and positive α-feto-
otein tests. The diagnosis of primary liver cancer
s confirmed at autopsy in 17 cases and was based
clinical, endoscopic, and arteriographic findings
the remaining 15 cases. Histological examination
the tumor in autopsied patients showed that 14
re hepatomas, 1 was a cholangioma, and 2 were
patocholangiomas. The test for α-fetoprotein was
sitive in 10 of the 15 autopsied patients with
imary liver cancer. Only 1 of these patients, a
-yr-old Frenchman with no history of blood trans-
sions or viral hepatitis, had a positive test for
Ag. Positive tests for HBAg were also obtained
2 of the controls with positive α-fetoprotein
sts: a 2-yr-old boy with a testicular dysembryoma
had received a blood transfusion and a patient
h viral hepatitis. The percentage of HBAg-
sitive patients with primary liver cancer in this
ries is about the same as in the general population
France, suggesting that HBAg plays little or no
e in the development of primary liver cancer in
nce.

1434 CLINICAL LIVER HETEROTOPIC (AUXILIARY) TRANSPLANTATION. *(E.)* Fortner, J. G.; Kinne, D. W.; Howland, W. S.; Kim, D. K.; Castro, E. B.; Yeh, S. D. J.; Benua, R. S.; Krumins, S. (Mem. Sloan-Kettering Cancer Ctr., New York, N.Y.). *Surgery* 74(5):739-751, 1973.

Heterotopic (auxillary) liver allograft was performed on 3 patients (1 boy and 2 women, aged 4 1/2 to 72 yr) with survival ranging from 35 days to 8 months, 1 remaining alive at 9 months time. Conditions leading to transplant included localized but unresectable adenocarcinoma involving common hepatic and intrahepatic bile ducts, chronic active hepatitis with several episodes of coma, and the absence of extra- and intrahepatic bile ducts. Laboratory tests prior to transplant showed serum total bilirubin ranging from 2.62 to 34 mg %; alkaline phosphatase, 263 to 312 I.U.; and SGOT, 117 to 228 U. One problem encountered in this operation is providing adequate space for the donor liver. In 1 patient the abdominal wall was reconstructed with prosthetic film to close over the auxiliary liver, in the second pneumoperitoneum was used and, in the third, ascites developed, markedly distending the abdomen. The right paravertebral region was chosen for placement of the allograft in all 3 patients for its contour, the ease with which it can be readied to receive the graft, and its proximity to structures necessary for support of the transplant. It is stressed that optimum conditions for the graft appear to be met when there are alterations in splanchnic venous blood flow so that the transplanted liver receives blood preferentially to the recipient's liver. Immune suppression appeared optimal with Cytoxan, low dosages of prednisone, short courses of high-dose methylprednisolone, and high doses of antihuman lymphocyte globulin.

1435 THE VALUE AND LIMITATIONS OF HEPATIC ARTERIOGRAPHY. *(Ger.)* Bucheler, E.; Boldt, I.; Frommhold, H. (Radiol. Clin., Univ. Bonn, Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 119(5):530-544, 1973.

The use of hepatic arteriography resulted in the establishment of correct diagnoses in 296 of 328 patients (90%) with liver diseases confirmed by surgery, autopsy, or the clinical course of the disease. Correct diagnoses were made in 51 of 54 patients (94%) with primary liver cancer, in 71 of 86 (82%) with hepatic metastases, in 37 of 41 (90%) with parasitic diseases, in 20 of 24 (84%) with benign tumors or cysts, in 100 of 105 (95%) with cirrhosis, in 4 of 4 (100%) with vascular disease, and in 13 of 14 (93%) with hepatic trauma. Despite the apparently good results obtained in patients with primary liver cancer, the diagnosis was usually established when tumor growth was advanced because of the relatively late development of symptoms which, in some cases, were atypical. False-positive diagnoses were made on 2 patients (one was diagnosed as having echinococcosis and the other as cirrhotic regeneration nodules), and a false-negative result was obtained in 1 case. Arteriography was less successful in the diagnosis of hepatic metastases since these tumors are generally small and often avascular. False-positive diagnoses of cancer (3 cases) and a cyst (1 case) were obtained in 10% of the patients with parasitic diseases. False-positive diagnoses of echinococcosis (1 case) and cancer (1 case) were made on 2 patients (8%) with benign tumors or cysts, and false-negative diagnoses were obtained in 2. False-positive diagnoses of cancer (3 cases) and chronic hepatitis (2 cases) were made on 5% of the cirrhotics. One false-negative result was obtained on a patient (7%) with hepatic trauma. It is concluded that hepatitic arteriography is a highly specific technique for diagnosing liver diseases and gives results which can be obtained by no other method.

1436 ALTERATION IN LIVER MITOCHONDRIAL METABOLISM IN A PATIENT WITH BILIARY OBSTRUCTION DUE TO LIVER CARCINOMA. *(E.)* Ozawa, K.; Takasan, H.; Kitamura, O.; Yamaoka, Y.; Mizukami, T.; Kamano, T.; Takeda, H.; Honjo, I. (Kyoto Univ. Fac. Med., Japan). *Am. J. Surg.* 126(4):653-657, 1973.

Alteration in liver mitochondrial metabolism was studied in a 65 year old patient with biliary obstruction due to liver carcinoma and in male rabbits. Human biopsy material weighing 0.4 to 0.8 gm was obtained from an area of the liver edge at operation and compared with controls from 21 patients (61 to 69 years old). There was an enhancement of about 200% of normal mitochondria adenosine triphosphate (ATP) synthesis, especially with nicotinamide-adenine dinucleotice linked substrates. The cytochrome $c+c_1$ contents were similar to those of the controls, but the concentrations of cytochromes $a(+a_3)$ and b increased to about 120% of control values. The mitochondrial metabolism of the left lobe increased, probably in a compensatory manner for the damaged right lobe. In the mitochondria from the right lobe, the phosphorylation rates were severely inhibited, especially with glutamate as a substrate. Autopsy specimens were taken 60 minutes after death. The mitochondria in both lobes showed extremely low levels of cytochromes $a(+a_3)$, b, and $c+c_1$. There is a compensatory hyperfunction followed by a depression of mitochondrial metabolism that is parallel to the progressive deterioration of liver viability. Experimental bile duct ligation was performed on healthy young male rabbits in which the left branch of the hepatic bile duct was ligated. In this way, about 60% of the hepatic tissue was damaged by obstructive jaundice. A reduction of about 50% in mitochondrial ATP synthesis was observed in the ligated lobe as early as 48 hours after ligation of the left hepatic bile duct. The phosphorylation rates in the nonligated lobe increased about twofold 2 days after operation and later decreased.

1437 METABOLIC RESPONSES OF THE LIVER OF HUMAN BEINGS AND OTHER MAMMALS TO DEPRIVATION OF PORTAL BLOOD SUPPLY. *(E.)* Ozawa, K.; Kitamura, O.; Yamaoka, Y.; Kamano, T.; Mizukami, T.; Takeda, H.; Takasan, H.; Honjo, I. (Kyoto Univ. Fac. Med., Japan). *Surg. Gynecol. Obstet.* 137(4):623-628, 1973.

The metabolic responses of the liver of 18 human beings (32 to 72 years old), adult male Wistar rats, rabbits, mongrel dogs, and monkeys to deprivation of portal blood supply were studied. The subjects were all subjected to ligation of a branch of the portal vein. In rats, serum glutamic oxalecetic transaminase activity began to rise within 4 hours, reached about 90 times higher than the preoperative level within 12 hours, and rapidly fell to normal at 24 hours. In rabbits, it reached a peak of about 16 times by 24 hours and fell to normal at 48 hours. In 6 patients with a normal value before the operation, the elevated serum glutamic oxalacetic transaminase activity averaged 6 times the preoperative level on the first postoperative day. Portal vein ligation in rabbits resulted in the rapid elevation of serum lactic dehydrogenase, sorbitol dehydrogenase, and malic dehydrogenase to levels as high as in serum glutamic oxalacetic transaminase. Serum leucine aminopeptidase was normal throughout. Electron microscopy showed swelling of mitochondria, decreased density of the matrix, abnormalities in the cristae, and a mild decrease in the number of mitochondria. The glutamic dehydrogenase activity in serum increased in parallel with the decrease of phosphorylation rates of the mitochondria from the ligated lobe. In nonligated lobes, the phosphorylative capacity of mitochondria was enhanced in parallel with the increase of glutamic dehydrogenase activity in serum. The phosphorylation rates in rats rapidly fell to 33% within 3 hours after portal ligation, whereas in rabbits those decreased to 66% within 12 hours. In dogs and monkeys, the phosphorylation rates were slightly decreased. The fatty acid concentration increased markedly within 12 hours, decreased rapidly, and reached the level of the control liver by 48 hours. In the absence of portal blood, the phosphorylative capacity for rats, rabbits, and possibly human beings decrease with progressive evolution of mammals.

1438 PRIMARY MALIGNANT MESENCHYMAL TUMORS (MESENCHYMOMA) OF THE LIVER IN CHILDHOOD. AN ANGIOGRAPHIC-PATHOLOGIC STUDY OF THREE CASES. *(E.)* Stanley, R. J.; Dehner, L. P.; Hesker, A. E. (Mallinckrodt Inst. Radiol., St. Louis, Mo.). *Cancer* 32(4):973-984, 1973.

Primary malignant mesenchymal tumors (mesenchymoma) of the liver in childhood were studied through 3 case histories of a 6 year old boy, and two 10 year old boys. A midstream aortogram and a selective celiac arteriogram were performed which demonstrated: a large hypovascular mass in the upper abdomen projecting slightly to the left (case 1), marked stretching and separation of the intrahepatic branches of the right hepatic artery and displacement to the left of the celiac axis and the common hepatic trunk (case 2), and stretching and separation of the intrahepatic arteries to the right lobe (case 3). Two children had partial hepatectomies and the other had multiple hepatic biopsies to establish the diagnosis. The histopathologic features of the 3 hepatic neoplasms were all very similar. There were 2 basic elements recognized in each of these tumors: anaplastic and ductlike structures. A more or less

mogeneous population of extremely anaplastic and
orly differentiated tumor cells existed in all 3
sions. In some areas, the cells were quite densely
cked with relatively little intercellular space,
ereas in others the background had an edematous
myxoid quality. Irregular clefts were present in
e tissue; however, a convincing demonstration of
endothelial lining was lacking. The other elements
these neoplasms were represented by ductlike
ructures representing either entrapped hepatic
cts or the less favored possibility of neoplastic
ood vessels. These ducts concentrated in the
ea of the tumor closest to the interface between
e uninvolved liver and the mass. Between the main
dy of tumor and the attached uninvolved liver, a
brous interface had formed. It was composed of
mnants of compressed hepatic parenchyma and small
cts.

39 HEMANGIOSARCOMA OF THE LIVER COMPLICATED BY DISSEMINATED INTRAVASCULAR COAGULATION.
CASE REPORT. *(E.)* Truell, J. E.; Peck, S. D.;
iquam, C. W. (Presbyterian Med. Ctr., Denver, Colo.).
stroenterology 65(6):936-942, 1973.

case report is presented of a 68 year old male with
mangiosarcoma of the liver complicated by dissemi-
ted intravascular coagulation. Symptoms leading to
s first hospital admission included a 2 month his-
ry of increasing weakness and fatigue, an 8-lb
ight loss, anorexia, nausea, epigastric fullness,
d discomfort. A liver scan showed hepatomegaly
th irregular uptake in both lobes and interpreted
diffuse hepatocellular disease consistent with
rrhosis. About 6 weeks later, he was readmitted
th 2 weeks of increasing ankle swelling, nausea,
d vomiting. Two months after his original admis-
on, he died. An autopsy was performed and the
gnificant findings are presented. The peritoneal
vity contained 500 cc of hemorrhagic fluid with a
matocrit of 45%. The liver weighed 3900 g. Its
psular surface was smooth, with many soft, fluc-
ant, blue-black cystic spaces. The parenchyma
s honeycombed by cystic vascular spaces, measuring
to 6 cm in diameter, several containing deposits
fibrin. Histological examination revealed a
ffuse variegated process with vascular spaces
ned by proliferating endothelial cells. The
mor nodules were highly cellular, forming occa-
onal vascular channels, containing red blood
lls. The cytology was that of a sarcoma with
rkedly pleomorphic, hyperchromatic nuclei and oc-
sional mitotic figures. The spleen weighed 120 g
d was unremarkable. The lungs contained changes
chronic obstructive disease with centrilobular
physema and foci of pleural and interstitial fi-
osis. The bone marrow was mildly hypercellular
th adequate numbers of megakaryocytes present.

40 SEGMENTAL OBSTRUCTION OF THE BILE DUCT.
(E.) Braasch, J. W.; Whitcomb, F. F.;
kins, E.; Maguire, R. R.; Khazei, A. M.
. Francis Hosp., Tulsa, Okla.). *Lahey Clin.
nd. Bull.* 23(1):24-31, 1974.

1441 CONTROLLED BILIARY DRAINAGE FOR LARGE INJURIES OF THE LIVER. *(E.)* Lucas, C. E.; Ledgerwood, A. M. (Dept. Surg., Wayne State Univ., Detroit, Mich.). *Surg. Gynecol. Obstet.* 137(4):585-589, 1973.

1442 LIVER GLYCOGEN STORAGE DISEASE: FIRST 2 BRAZILLIAN CASES WITH DOUBLE ENZYMATIC DEFECT. *(Fr.)* Seibt, F. L.; Mello De Oliveira, J. A.; Santoro, J. R.; Alcantara, A.; Dora, G. L.; Rena, G. A. P. (Fac. Med., Rio Grande, Brazil). *Ann. Histochim.* 18(3):253-265, 1973.

1443 A MORPHOLOGICAL STUDY OF THE INVASION OF LIVER TISSUE BY TUMOUR CELLS. *(E.)* Dingemans, K. P. (Netherlands Cancer Inst., Amsterdam). *Arch. Chir. Neerl.* 25(4):351-362, 1973.

1444 BILIARY TRACT ABNORMALITIES ASSOCIATED WITH DUODENAL ATRESIA. *(E.)* Reid, I. S. (Royal Alexandra Hosp. Children, Camperdown, Australia). *Arch. Dis. Child.* 48(12):952-957, 1973.

1445 LIGATION OF THE HEPATIC ARTERY AND REGIONAL CHEMOTHERAPY. *(Fr.)* Bourgeon, R.; Mouiel, J.; Borelli, J. P.; Isman, H. (Hosp. Res. Ctr., Nice, France). *Chirurgie* 99(2):161-166, 1973.

1446 PRIMARY LEIOMYOSARCOMA OF THE LIVER. *(E.)* Fong, J. A.; Ruebner, B. H. (Univ. California, Sch. Med., Davis). *Hum. Pathol.* 5(1):115-119, 1974.

1447 EFFECT OF CHRONIC BILE DUCT OBSTRUCTION ON RENAL FUNCTION. *(E.)* Angelides, N. S. (Nicosia Gen. Hosp., Cyprus). *J. Med. Liban.* 26(4):393-401, 1973.

1448 TUBERCULOSIS OF THE LIVER: SCAN APPEARANCE BEFORE AND AFTER SUCCESSFUL TREATMENT. *(E.)* Small, M. J. (VA Hosp., East Orange, N.J.). *J. Nucl. Med.* 15(2):135-136, 1974.

1449 THE AFLATOXINS AND HUMAN LIVER CANCER. *(E.)* Linsell, C. A.; Peers, F. G. (Nairobi Reg. Ctr. Internatl. Agency Res. Cancer, Kenya). *Recent Results Cancer Res.* 39:125-139, 1972.

1450 REPERCUSSIONS OF LIVER DAMAGE ON THE SERUM ENZYME PATTERN IN PATIENTS WITH MYOCARDIAL INFARCTION. *(Cz.)* Ninger, E.; Tovarek, J. (Oncol. Inst., KUNZ, Brno, Czechoslovakia). *Vnitr. Lek.* 18(10):989-996, 1972.

1451 EFFECT OF ARGININE ON RECURRENT HEPATIC COMA COMPLICATING A FEMINIZING TUMOR OF THE ADRENAL CORTEX WITH HEPATIC METASTASES. *(Fr.)* Imler, M.; Ruscher, H.; Peter, B.; Kurtz, D.;

Stahl, J. (Univ. Hosp. Ctr., Strasbourg, France). *Sem. Hop. Paris* 49(48):3183-3190, 1973.

1452 COMPARATIVE EVALUATION OF SOME CRITERIA FOR THE FUNCTIONAL STATUS OF THE LIVER IN PATIENTS WITH CHRONIC MYELOID LEUKEMIA. *(Rus.)* Streletskaia, E. I. (Kishinev Med. Inst., USSR). *Zdravookhr. Ross. Fed.* (5):15-19, 1973.

1453 CLINICAL AND FUNCTIONAL CHANGES IN THE LIVER IN PATIENTS WITH CHRONIC PESTICIDE POISONING. *(Rus.)* Ishchukova, M. P. (no affil.). *Zdravookhr. Ross. Fed.* (5):19-23, 1973.

1454 HEPATITIS CAUSED BY BRUCELLA MELITENSIS. *(Sp.)* Carneado de la Fuente, J.; Caraballo Guijarro, R.; Rey Romero, C. (Virgen del Rocio Munic. Sanit., Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(3):267-274, 1973.

1455 EFFECT OF SILYMARIN IN THE TREATMENT OF DIFFUSE PARENCHYMAL LIVER DISEASES. *(Sp.)* Sanchez de la Cuesta y Alarcon, F.; Oporto Ruiz, T.; Martinez Lopez, J. (Fac. Med., Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(1):87-104, 1973.

1456 HEPATIC CYSTS: REVIEW. *(Fl.)* Deruyttere, M.; Fevery, J. (St. Rafael Acad. Hosp., Louvain, Belgium). *Tijdschr. Gastroenterol.* 15(5):328-336, 1972.

1457 AUTOCHTHONOUS INTRAHEPATIC CHOLELITHIASIS IN THE FAR EAST. *(Fr.)* Gruet, M.; Daney, A.; Barnaud, P.; Baychelier, C. (Desgenettes Hosp., Lyon, France). *Lyon Chir.* 69(5):329-330, 1973.

See also, 0826, 1138, 1141, 1143, 1152, 1161, 1162, 1170, 1171, 1172, 1180, 1182, 1189, 1191, 1192, 1207, 1212, 1216, 1219, 1220, 1221, 1256, 1259, 1346, 1407, 1508, 1566, 1574, 1592, 1595, 1596, 1598, 1601.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

1458 EFFECT OF PHENOBARBITONE ON BILE FLOW AND BILIRUBIN METABOLISM IN MAN AND THE RAT. *(E.)* Maxwell, J. D.; Hunter, J.; Stewart, D. A.; Carrella, M.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 9(2): 138-148, 1973.

A group of male Wistar rats received phenobarbitone (90 mg/kg/day, i.p. for up to 10 days). Bile flow peaked after 4-6 days at about 50% above control levels of 250 μl/100 g/hr. Liver weight rose progressively with a striking early increase in cytochrome P450 to 2.5 times the control level of 0.70 μmol/mg protein. However, it is noted that the ratio of the increase in liver weight to body weight did not parallel the increase in bile flow. Bilirubin glucuronyl transferase activity increased 9%. Plasma bilirubin levels and excretion of endogenous bilirubin remained unchanged, indicating that phenobarbitone had no effect on bilirubin metabolism. Phenobarbitone was similarly administered to 4 homozygous Gunn rats and some increase in the excretion of a large exogenous load of conjugated bilirubin was noted. Phenobarbitone (60-100 mg/day for one month) was given to 12 patients (9 males and 3 females, all adults) with unconjugated hyperbilirubinemia of Gilbert's syndrome. A mean reduction of 60% in plasma bilirubin from 1.92 to 0.74 mg/100 ml was observed after 4 weeks of treatment. Accompanying this was a large increase in urinary D-glucaric acid excretion from 9.9 to 37.2 μmol/day, indicating that even with the low dose used, there was increased activity of hepatic microsomal enzymes. BSP Tm and BSP S did not significantly change. Thus, at these doses, the drug caused no change in bile flow. There was a significant correlation between plasma bilirubin levels and glucaric acid excretion in patients with Gilbert's syndrome, suggesting that the reduction in plasma bilirubin is related to increased activity of hepatic microsomal enzymes. A similar correlation was noted in 56 control subjects without liver disease who also underwent phenobarbitone treatment.

1459 ENTEROHEPATIC CIRCULATION OF BILIRUBIN IN PRENATAL AND POSTNATAL LIFE: AN ALTERNATIVE PATHWAY FOR CONTROL OF NEONATAL HYPERBILIRUBINEMIA. *(E.)* Lampe, L.; Hafez, E. S. E. (Dept. Gynecol.-Obstet., Wayne State Univ., Detroit, Mich.). *J. Reprod. Med.* 11(5):225-232, 1973.

The interruption of the enterohepatic circulation of bilirubin is proposed as a control of neonatal hyperbilirubinemia. Physiologic neonatal jaundice occurs only in primates. The metabolism of adult and fetal bilirubin varies with respect to hemoglobin synthesis, life span of erythrocytes, liver enzyme kinetics, and excretory processes. After hemoglobin-bilirubin transformation, the pigment is bound to albumin and transported to the liver. Mammalian liver contains uridine diphosphoglucuronic acid transferase (UDP transferase) which transfers the glucuronic acid from uridine diphosphoglucuronic acid (UDPGA) to the bilirubin. This produces a water soluble form more readily excreted. Since all excreted bilirubin in mammals is conjugated, there is no evi-

ence of an enterohepatic circulation of bilirubin
n normal adults. Fetal hemopoiesis is characterized
embryonic, fetal, and adult types of hemoglobin
ynthesis, shorter life span of erythrocytes, and
igher hemoglobin concentration. The UPDGA and UDP-
ransferase content of fetal liver is lower but
ises soon after birth. The presence of β-glucuro-
idase in the fetal and neonatal intestine makes
ssible hydrolysis of conjugated bilirubin. This
nconjugated bilirubin is rapidly absorbed from the
mall intestine, but the transplacental gradient
llows excretion from fetus to mother. When the
ord is cut, the newborn is deprived of placental
learance. The interruption of this enterohepatic
irculation of bilirubin with medicinal charcoal,
ynthetic resin, or agar is proposed as an effective
ethod of reducing high unconjugated hyperbilirubine-
ia in lieu of photochemical methods now in vogue.

460 ETHANOL IN THE PREVENTION OF NEONATAL HYPERBILIRUBINAEMIA. *(E.)* Jouppila, P.;
oivisto, M.; Suonio, S. (Dept. Obstet. Gynecol.,
niv. Oulu, Finland). *Acta Paediatr. Scand.* 62(5):
01-504, 1973.

The effect of ethanol on the bilirubin values of newborns was studied. Seventy-four pregnant women with mild pre-eclampsia and suspected postmaturity were given 80 g of ethanol orally or 63, 94 or 102 g i.v. Nineteen mothers and their offspring served as controls. The bilirubin levels of the newborn were not significantly lower during the first 6 days of life compared with the controls. The highest bilirubin level was reached on the third to fifth day in all the groups. The results differ from those reported earlier.

1461 IRON METABOLISM AND STORAGE IN GILBERT'S DISEASE, AND IN ROTOR'S AND DUBIN-JOHNSON'S SYNDROMES. *(E.)* Burger, T.; Gogl, A.; Javor, T.; Patakfalvi, A. (Univ. Med. Sch., Pecs, Hungary). *Acta Med. Acad. Sci. Hung.* 29(3-4):331-338, 1972.

See also, 1063.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

462 HISTIOCYTIC MEDULLARY RETICULOSIS APPEARING AS ACUTE HEPATIC NECROSIS.
.) Steiner, J. A.; Perkins, K. W.; McGovern,
. J. (Dept. Med., Univ. Sydney, Australia).
ed. J. Aust. 2(10):496-498, 1973.

he case history of a 26-year-old process worker
ith histiocytic medullary reticulosis is pre-
ented. He was well until 4 weeks before ad-
ission, when anorexia and nausea commenced,
ollowed after several days by vomiting and in-
reasingly severe right hypochondrial pain.
aundice was first observed 3 weeks prior to his
dmission and increased steadily. On the day
efore admission he developed severe pleuritic
ain in the left hypchondrium. The liver was en-
arged 8 cm and the spleen 6 cm below the costal
argin and both were extremely tender. During
he first 5 days in the hospital, the upper
bdominal pain and vomiting persisted and the
atient's signs remained unchanged. On the fifth
ay, therapy with prednisone 60 mg/day was commenced
nd the patient's condition improved subjectively.
n the tenth hospital day, liver biopsy showed
entrilobular necrosis with no inflammatory re-
ponse except in the portal tracts. There were
lso groups of cells suggestive of extramedullary
rythropoiesis. The dose of prednisone was re-
uced to 10 mg/day by day 16; clinical deteriora-
ion occurred. The dose of prednisone was in-
reased, but clinical deterioration continued.

The significant findings at autopsy were as follows. The liver was enlarged; the cut surface showed prominence of markings with visible red centers in the lobules. The lungs were heavy. There were petechial spots in the pleura and hemorrhagic edema in the lung tissue itself. On microscopic section, the normal splenic architecture was replaced by proliferations of histiocytes of varying grades of malignancy. In the liver, there was widespread centrilobular necrosis, malignant transformation of the Kupffer cells, and erythrophagocytosis and foci of erythropoiesis.

1463 LIVER ABSCESS IN NEWBORN. COMPLICATION OF UMBILICAL VEIN CATHETERIZATION. *(E.)* Williams, J. W.; Rittenberry, A.; Dillard, R.; Allen, R. G. (Univ. Tennessee Coll. Med., Memphis). *Am. J. Dis. Child.* 125(1):111-113, 1973.

1464 OCCUPATIONAL LIVER AND KIDNEY DISEASES. *(Fr.)* Prost, G.; Dechavanne, M.; Tolot, F. (no affil.). *J. Med. Lyon* 54(1248):643-652, 1973.

1465 SEVERE JAUNDICE AND ANURIA AFTER HALOTHANE. *(Fr.)* Ganeval, D.; Kleinknecht, D.; Chapus, G.; Nogues, C. (Necker Hosp., Paris, France). *Nouv. Presse Med.* 3(1):23-26, 1974.

1466 DRUG-INDUCED LIVER DAMAGE. *(Ger.)* Thaler, H. (Wilhelminen Hosp., Vienna, Austria). *Z. Allgemeinmed.* 49(7):300-304, 1973.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

1467 REASONS FOR AND AGAINST CORTICOSTEROID THERAPY IN VIRAL HEPATITIS. *(Fr.)* Biron, A. (d'Orsay Hosp., Paris, France). *Rev. Fr. Gastroenterol.* (89):53-56, 1973.

Complications developed in 23.9% of 196 patients with liver disease who received corticosteroids. Corticosteroids were used to treat 84 patients with acute hepatitis, 70 with chronic hepatitis, and 42 with cirrhosis. Corticosteroids were only given to patients with acute hepatitis if they were over 60 yr old and had elevated serum transaminase activities or if they had bilirubin levels greater than 120 mg/liter and disturbances in the prothrombin complex which showed no improvement over a 2-week period. In chronic hepatitis and cirrhosis, corticosteroids were limited to patients with signs of progressive disease (elevated serum transaminase levels or large decreases in total cholesterol) which did not respond to choleretic, hepatoprotective, or lipotropic agents. Of the 42 cirrhotics, 9 developed rebound, 14 diabetes, 3 peptic ulcers, and 3 fractures resulting from osteoporosis. Because of the high incidence of complications among patinets treated with corticosteroids, these agents have recently been replaced by immunosuppressants (50-150 mg/day azathioprine, 50-100 mg/day 6-mercaptopurine, and 6-8 mg/day chlorambucil) in the treatment of chronic hepatitis. It is recommended that corticosteroids be associated with immunosuppressants for the best results.

1468 AUSTRALIA ANTIGEN IN MOSQUITOES. FEEDING EXPERIMENTS AND FIELD STUDIES. *(E.)* Blumberg, B. S.; Sills, W.; Millman, I.; London, W. T. (Inst. Cancer Res., Philadelphia, Pa.). *Res. Commun. Chem. Pathol. Pharmacol.* 6(2):719-732, 1973.

Individual mosquitoes trapped in the field in Africa and mosquitoes studied in a laboratory were tested for Australia antigen (Au) by radioimmunoassay. *Anopheles stephensi* fed on blood containing Au had detectable Au up to 48 hours after feeding. Ten of 42 mosquitoes trapped in residential areas in East and Central Africa had detectable Au. In addition, one collection of eggs from *Anopheles stephensi* which had fed on blood containing Au was found to have Au. These findings support the hypothesis that mosquitoes could be a vector of Australia antigen and hence hepatitis virus for man. They suggest an additional hypothesis that Au could be maintained in mosquito populations by way of maternal transmission.

1469 GLUCOSE TOLERANCE AND METABOLIC CHANGES IN HUMAN VIRAL HEPATITIS. *(E.)* Record, C. O.; Alberti, K. G. M. M.; Williamson, D. H.; Wright, R. (King's Coll. Hosp. Med. Sch., London, England). *Clin. Sci. Mol. Med.* 45(5):677-690, 1973.

Glucose tolerance and metabolic changes after intravenous glucose were studied in 15 patients with acute viral hepatitis and in 8 patients after recovery. In the acute stage glucose tolerance was significantly impaired compared with control subjects or with patients after recovery from hepatitis. Serum insulin concentrations were significantly higher in fasting acute hepatitis patients than in control subjects and the time-integrated serum insulin concentration in the first 5 min after glucose was inappropriately high for the observed glucose disappearance rate, indicating insulin resistance. Serum growth hormone concentrations in male acute hepatitis patients were significantly higher than controls and suppressed poorly. Fasting blood lactate concentrations were significantly elevated and after intravenous glucose there was a variable response. 2-Oxoglutarate, glutamate and glutamine concentrations from blood of fasting subjects, were significantly higher in acute hepatitis patients than controls. There were no significant differences in blood ketones, glycerol and plasma free fatty acid concentrations from fasting subjects, but plasma triglycerides were significantly increased in the acute hepatitis patients. The results indicate that viral hepatitis is associated with glucose intolerance and insulin resistance. After recovery the lactate response after glucose is diminished compared with controls.

1470 HEPATITIS B ANTIGEN IN FAMILIES OF BLOOD DONORS. *(E.)* Berris, B.; Wrobel, D. M.; Sinclair, J. C.; Feinman, S. V. (New Mt. Sinai Hosp., Toronto, Canada). *Ann. Intern. Med.* 79(5):690-693, 1973.

The family members of 46 volunteer Red Cross blood donors positive for HB Ag were tested for HB Ag. The prevalence of positive relatives was 13%, compared with 0.15% in the donors. Seventeen of the 18 positive relatives were from families who originated in countries where the HB Ag carrier rate is high

d only one was from countries where it is low.
e high prevalence countries include: Italy, China,
eece, West Indies, Malta, Pakistan, and Nigeria.
e low prevalence countries are: Canada, Great
itain, Germany, and South Africa. The prevalence
positive kindred from high-prevalence countries
s 23%, and it seemed to be more related to ethnic
igin than country of birth. Among the first-
gree relatives the positive members were approxi-
tely equally distributed among siblings, parents,
d offspring. None of 28 marital partners was
sitive. Whether the family clustering is owing
an epidemiologic or genetic relationship requires
rther study.

71 ACUTE VIRAL HEPATITIS: COURSE AND INCIDENCE OF PROGRESSION TO CHRONIC HEPATITIS.
.) Vittal, S. B. V.; Thomas, Jr., W.; Clowdus,
F. (Chicago Med. Sch., Ill.). *Am. J. Med.*
(6):757-761, 1973.

a prospective study, 53 consecutive patients with
opsy-proved acute viral hepatitis were observed
rially and treated identically during a 15 week
riod following the onset of jaundice. They were
vided into four groups on the basis of the pres-
ce or absence of hepatitis-associated antigen
AA) and the presence or absence of parenteral ex-
sure to a potential source of HAA. Even though
e degree of hepatocellular necrosis was greater
the HAA-positive group, irrespective of the portal
entry of HAA, 89.2% of HAA-positive and 83.3% of
A-negative subjects made equally rapid and complete
covery within 6 weeks after the onset of illness.
e development of chronic active hepatitis in the
mainder was associated with either the persistence
HAA in the serum beyond the thirteenth week of
lness or the presence of a positive lupus erythema-
sus test during the first and subsequent weeks of
lness. It is concluded that in the majority of
tients with acute viral hepatitis, recovery is
mplete but that chronic active hepatitis will
velop in patients in whom HAA persists beyond 13
eks of illness or in whom the lupus erythematosus
st is positive and antinuclear antibody (ANA) is
esent at the onset of illness (11.3%).

72 IMMUNOAGGLUTINATION ELECTRON MICROSCOPIC STUDY ON VIRUS-LIKE PARTICLES AND AUSTRALIA
TIGEN IN LIVER TISSUE. *(E.)* Huang, S.-N.; Groh,
(Dept. Pathol., McGill Univ., Montreal, Canada).
. *Invest.* 29(4):353-366, 1973.

mogenized liver tissues from five patients suffer-
g from persistent Australia antigenemia and chronic
tive hepatitis (type B) were shown by electron
croscopy on phosphotungstic acid-stained prepara-
ons to contain noncoated virus-like particles 270
d 290 Å in size and Australia antigen (Au-Ag)
nsisting of Dane particles 420 to 460 Å in size,
laments 200 to 260 Å in diameter, and a few small
herical particles 200 to 220 Å in diameter. A sim-
e method of immunoagglutination electron microscopy
s used to facilitate the detection of Australia
tigen. The method includes maceration of liver
tissue, digestion with Pronase to clear up the cell debris, and reaction of the digested homogenate with rabbit Au-Ag antiserum. The tissue fluids were stained with phosphotungstic acid for electron microscopic examination. The noncoated particles were found singly or in clusters irrespective of the treatment with Au-Ag antiserum. These particles showed icosahedral symmetry and presence of capsomere-like surface structures. They are morphologically identical with the internal core of the Dane particles. The immunoagglutination electron microscopy showed formation of Au-Ag immune complexes, which are composed exclusively of Dane particles, filaments, and small spherical particles, but not the previously described noncoated particles. Similar study made on the serum showed identical Au-Ag complexes and no noncoated particles. The results indicate that the noncoated particles are antigenically different from the Au-Ag, which is probably the virus-induced protein coat that forms the envelope of the Dane particles, the filaments, and the small particles. The finding of the noncoated and the coated particles (the Dane particle) is probably pathognomonic for type B viral hepatitis. Pronase digestion did not affect the immunoreactivity of Au-Ag nor the agglutinin effect of the antiserum in this study. The method is useful in the study of antigenic characterization of hepatitis virus and its related products.

1473 VIRAL HEPATITIS B IN NEONATES AND INFANTS.
(E.) Schweitzer, I. L.; Dunn, A. E. G.; Peters, R. L.; Spears, R. L. (John Wesley County Hosp., Los Angeles, Calif.). *Am. J. Med.* 55(6): 762-771, 1973.

The clinical and biochemical course in 17 hepatitis B antigen (HBAg)-positive infants is described. Their mothers had acute hepatitis B while pregnant or in the first 2 postpartum months. Neonatal infection developed in 1 of 10 babies when maternal hepatitis occurred in the first 2 trimesters and in 16 of 21 when it occurred in the third trimester or within 2 months after delivery. The cord bloods of 7 infants who become antigen-positive were tested and HBAg was detected in 4. In 2 of the 17 infected infants acute icteric hepatitis developed at 3 and 4 months of age. In these cases, the illness was mild, HB antigenemia was transient, and significant titers of hepatitis B antibody (HBAb) developed following recovery. Thirteen infants who became infected showed no clinical signs of illness, but their serums remained consistently antigen-positive for up to 39 months with prolonged serum glutamic pyruvic transaminase (SGPT) elevations. Liver biopsies performed on 10 infants between 3 and 27 months of age revealed the histologic features of unresolved hepatitis; increased portal fibrosis was observed in 1 case. Electron microscopic examination revealed 24 nanometer virus-like particles in hepatocyte nuclei of 6 of 9 cases studied. The most consistent pathologic change seen at the ultrastructural level was cytoplasmic "ballooning" which occurred in some areas of every case. The most common response of neonates to hepatitis type B virus (HBV) exposure is chronic, hepatitis B with the histologic features of unresolved hepatitis. Long-term follow-up will be required to determine the final evolution of this lesion. An occasional neonate in whom acute icteric hepatitis B develops may experience rapid healing with prompt loss of antigenemia followed by the development of significant HBAb titers.

1474 STUDIES ON THE INCIDENCE OF HEPATITIS IN CLINICALLY NORMAL, AUSTRALIA ANTIGEN POSITIVE BLOOD DONORS.

(Ger.) Eisenburg, J.; Meister, P.; Fruhauf, S.; Greis, I.; Krumpoch, B.; Weinzierl, M.; Grunst, J.; Munte, A.; Rasch, L. (1st Med. Clin., Univ. Munich, Germany). *Klin. Wochenschr.* 51(23):1143-1150, 1973.

Routine testing of 7000 apparently normal blood donors showed that 95 were positive for Australia antigen (HBAg). Liver biopsies, performed by Menghini's technique on 62 of these 94 donors, revealed that 9 (1[illegible]%) had chronic persistent hepatitis, 10 (16%) had active hepatitis, 30 (49%) had changes consistent with unresolved mild hepatitis or minimal liver damage, while only 13 (21%) of these HBAg-positive donors had no evidence of liver disease. Follow-ups of 7 of the 10 patients with active hepatitis showed that one had a protracted form and another developed chronic active hepatitis. None of the patients with chronic persistent hepatitis developed active forms of the disease. In donors with active or chronic persistent hepatitis, good correlations were found between histological and biochemical findings (serum bilirubin, SGOT, SGPT, cholinesterase, alkaline phosphatase, plasma proteins, immunoglobulins, and prothrombin time), while biochemical findings were completely normal in patients with minimal liver damage. Tests for HBAg remained positive for more than 12 months in 26 of the 62 biopsied patients; these included 6 patients with chronic persistent hepatitis. Of the HBAg-positive donors, 13 were patients who repeatedly donated 500 ml/week of plasma; 6 developed chronic persistent hepatitis. Because of the small number of patients in this group, it could not be determined whether an immune deficiency is involved in the development of this form of hepatitis in plasma donors.

1475 CHOLESTATIC FORMS OF VIRAL HEPATITIS.

(Fr.) Laverdant, C.; Cristau, P.; Molinie, C.; Essioux, H.; Duret, J. C. (H. I. A. Begin, St. Mande, France). *Ann. Med. Interne (Paris)* 124(8/9):607-610, 1973.

Although the cholestatic form of viral hepatitis usually accounts for no more than 1% of all cases, 27 of 402 patients treated between August 1971 through July 1972 had this form. These 27 patients consisted of 22 men and 5 women, aged 18-50 yr. Histories of contact with hepatitis patients were obtained in 19 cases (14 in France and 5 abroad). Australia antigen was present in 12 (44%) patients with the cholestatic form of viral hepatitis in contrast to 11.54% in all patients with viral hepatitis. Four of the 5 patients who had been repatriated from Africa were positive for Australia antigen. In contrast to ordinary viral hepatitis, which reaches a peak between November and January, the cholestatic form reached its peak in February and March, indicating that type B virus was involved. The most common clinical symptoms of cholestatic viral hepatitis were pruritis (17 cases) and hepatomegaly (19 cases). Serum bilirubin levels, which were higher than 100 mg/liter on day 5 in all cases, reached a maximum (155 ± 22 mg/liter) on day 20 and remained elevated as long as 4-5 months. Alkaline phosphatase values peaked on day 10 and decreased progressively until the 6th month when they increased again. In many patients SGPT activities decreased more rapidly than in the common form of viral hepatitis but increased again between the 3rd and 5th month. Hyperlipidemia and hypertriglyceridemia were observed. Electrophoresis showed a great increase in β-lipoproteins and the absence of α- and pre-β-lipoproteins. Results of the thymol turbidity test normalized more rapidly than in the common form of viral hepatitis. Although 19 of these 27 patients were less than 30 yr old, recovery was slow and hepatitis persisted for 4-7 months in 6 cases. Two patients died: one of hepatic coma on day 21 and the other of gastrointestinal bleeding during the 2nd month.

1476 EXPERIENCE IN THE TREATMENT OF HEPATIC FAILURE BY INTERMITTENT LIVER HEMOPERFUSIONS.

(E.) Abouna, G. M.; Fisher, L. McA.; Porter, K. A.; Andres, G. (Med. Coll. Georgia, Augusta). *Surg. Gynecol. Obstet.* 137(5):741-752, 1973.

Thirty-three clinical *ex vivo* liver hemoperfusions were used for the treatment of deep hepatic coma in ten patients. The *ex vivo* livers came from 22 pigs, 7 baboons, 2 human cadavers, 1 calf, and 1 Macaca monkey. Perfusions were maintained for 5 to 52 hours using a standardized perfusion technique. Normal consciousness was restored in 5 of the patients, and 2 of these have survived for more than 2 years after treatment. Consciousness could be restored in all of the patients when the baboon liver was used, the success rate was only 30% when pig liver was used. Serious complications were rare, and bleeding problems were not encountered. Immunologic problems occurred only with pig liver perfusions, and these included clinical anaphylactic reaction, development of species-specific antibody, cross reacting antibody, and antiporcine serum protein antibody. Histologic and immunofluorescent observations showed acute humoral heterograft rejection in porcine but not in the baboon livers. Intermittent liver perfusions were capable of restoring consciousness on repeated occasions in the same patient however, ultimate survival was dependent upon the degree of initial damage of patient's own liver and on the development of extrahepatic complications. Intermittent *ex vivo* perfusions using the baboon liver have a definite place in the treatment of hepatic coma in patients with acute liver necrosis and in selected patients with chronic irreversible liver disease who might be supported for short periods while awaiting liver transplantation.

1477 CELL-MEDIATED IMMUNITY TO HEPATITIS-ASSOCIATED ANTIGEN (HAA) DEMONSTRATED BY LEUCOCYTE MIGRATION TEST DURING AND AFTER ACUTE B

HEPATITIS. *(E.)* Frei, P. C.; Erard, P.; Zinkernagel, R. (Hospital Cantonal Univ., Lausanne, Switzerland). *Biomedicine* 19(9):379-383, 1973.

Circulating leukocytes from patients with hepatitis were assayed for migration inhibition in the presence of purified hepatitis-associated antigen (HAA) using an agarose technique. The following groups of patients were used: 9 healthy individuals, 8 patients with hepatitis, and 9 patients who had recovered from hepatitis. A significant inhibition of leukocyte migration by purified HAA was observed in a group of 9 individuals who had recovered 5 to 30 months previously from HAA-positive hepatitis and who no longer had detectable serum HAA. In contrast, a stimulation of leukocyte migration was observed in 8 patients during the course of acute hepatitis, while the HAA was detectable in the serum; furthermore leukocytes from 9 normal individuals, who had no previous history of hepatitis, were not inhibited by HAA. A significant migration inhibition could be demonstrated with purified antigen, but not with partially or non-purified HAA. PPD was also used as an antigen for migration inhibition of leukocytes from these same individuals and the results obtained were found to correlate regularly with PPD-delayed skin-tests. The results suggest the development of specific cell-mediated immunity to HAA after the recovery from acute B-virus hepatitis.

1478 ALTERATION OF ENZYME HISTOCHEMISTRY IN LIVER CELLS ATTACKED BY HUMAN HEPATITIS VIRUS. *(E.)* Kautzsch, E. F. (Munic. Hosp., Munich, Germany). *Acta Hepatogastroenterol.* 20(4): 303-306, 1973

1479 ADVANCES IN AUSTRALIA ANTIGEN. *(Fr.)* Soulier, J. P. (Fac. Med., Paris, France). *Rev. Fr. Gastroenterol.* (85):53-56, 1973.

1480 HEPATITIS AND HEPATITIS B-ANTIGEN IN GREENLAND. *(E.)* Skinhoj, P.; McNair, A.; Andersen, S. T. (Bispebjerg Hosp., Copenhagen, Denmark). *Am. J. Epidemiol.* 99:50-57, 1974.

1481 IMMUNOLOGICAL STUDY OF VIRAL HEPATITIS. *(Fr.)* Ribet, A.; Frexinos, J.; Dambrin, G.; Oksman, F. (Purpan Hosp., Toulouse, France). *J. Med. Lyon* 54(1240):5-15, 1973.

1482 CLINICAL FORMS, DIAGNOSIS, AND TREATMENT OF VIRAL HEPATITIS. *(Fr.)* Trepo, C.; Bel, A. (no affil.). *J. Med. Lyon* 54(1245):407-416, 1973.

1483 VIRAL HEPATITIS: NEW EPIDEMIOLOGICAL AND PROPHYLACTIC VIEWS OPENED BY AUSTRALIA ANTIGEN. *(Fr.)* Trepo, C. (no affil.). *J. Med. Lyon* 54(1248):627-632, 1973.

1484 AUSTRALIA ANTIGEN AND LIVER DISEASE: A REVIEW ARTICLE. *(E.)* Edington, G. M. (Dept. Pathol., Ahmadu Bello Univ., Zaria, Nigeria). *J. Trop. Med. Hyg.* 76(10):270-272, 1973.

1485 EPIDEMIOLOGY OF HEPATITIS IN SWITZERLAND. (CONCLUSION). *(Ger.)* Gassner, M.; Grob, P. J. (Cantonal Hosp., Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 103(52):1873-1882, 1973.

1486 ATTEMPTS TO ISOLATE COMPONENTS OF SERUM HEPATITIS VIRUS IN ISOLATED MITOCHONDRIA. *(Rus.)* Zhdanov, V. M.; Ketiladze, E. S.; Paktoris, E. A. (D. I. Ivanovskii Inst. Virol., Moscow, USSR). *Vestn. Akad. Med. Nauk SSSR* (1):3-8, 1973.

1487 OBSERVATION OF AUSTRALIA ANTIGEN AND ANTIBODY IN SELECTED PATIENTS AND IN BLOOD DONORS. *(Cz.)* Hendrich, F.; Vacl, J. (Fac. Med., Brno, Czechoslovakia). *Vnitr. Lek.* 18(10):944-948, 1972.

1488 INTESTINAL BLEEDING AS A COMPLICATION OF PREDNISOLONE THERAPY IN INFECTIOUS HEPATITIS. *(Rus.)* Ovchinnikov, Iu. M. (Hosp. Infect. Dis., Sterlitamak, USSR). *Vrach. Delo* (9):147-148, 1973.

See also, 1050, 1149, 1165, 1176, 1190, 1194, 1196, 1197, 1198, 1203, 1224, 1225, 1514.

LIVER AND BILIARY TRACT

Chronic Hepatitis

1489 COMPLEMENT AND LIVER CELL FUNCTION IN 53 PATIENTS WITH LIVER DISEASE. *(E.)* Kourilsky, O.; Leroy, C.; Peltier, A. P. (Tenon Hosp., Paris, France). *Am. J. Med.* 55(6):783-790, 1973.

Serum complement levels were studied in 53 patients with various liver diseases. The total serum complement level (CH50) was raised in 28, normal in 12 and low in 13 patients. Levels of C4, C2 and C3 in general parallelled total complement levels. Significant positive correlations were obtained between the total complement and albumin, cholesterol, fibrinogen, proaccelerin, and prothrombin. Significant correlations were noted between the levels of C4 and C3 and those of certain coagulation factors, and between the levels of C2 and fibrinogen. C4 was positively correlated with cholesterol, prothrombin time, and prothrombin; C2 was positively correlated with fibrinogen, proconvertin-Stuart factor, and prothrombin; and C3 was positively correlated with albumin, cholesterol, fibrinogen, prothrombin time, preconvertin-Stuart factor, proaccelerin, and prothrombin. The data obtained suggest that, in the majority of cases, lowering of serum complement levels is related to defective hepatic synthesis, providing further support for the role of the liver in the synthesis of some complement components.

1490 MULTISYSTEM INVOLVEMENT IN CHRONIC LIVER DISEASE. STUDIES ON THE INCIDENCE AND PATHOGENESIS.

(E.) Golding, P. L.; Smith, M.; Williams, R. (King's Coll. Hosp. Med. Sch., London, England). *Am. J. Med.* 55(6):772-782, 1973.

The incidence and pathogenesis of multisystem involvement in chronic liver disease were studied in a total of 218 patients. Sjogren's syndrome occurred in 37%, renal tubular acidosis in 32%, pulmonary diffusion defects in 26% and peripheral neuropathy in 10% of patients with active chronic hepatitis, primary biliary cirrhosis or cryptogenic cirrhosis. The incidence of certain other conditions determined from clinical features alone was lower; these included arthropathy in 14%, thyroid disorders in 10%, skin lesions in 17% and colitis in 5%. In the complete series of 218 patients, 125 (57%) had involvement of at least one organ other than the liver, such involvement being significantly more common in those with active chronic hepatitis (63% of cases) and primary biliary cirrhosis (68%) than in those with cryptogenic cirrhosis (38%). In a number of patients, prednisone therapy was followed by both subjective and objective improvement in the features of the multisystem involvement. No correlation could be found between multisystem involvement and the presence of mitochondrial, smooth muscle or antinuclear antibodies in the serum or with the serum levels of immunoglobulins A (IgA), M (IgM) and G (IgG). Histologic examination of the various organs disclosed dense infiltration with small lymphocytes, suggesting that delayed hypersensitivity reactions were involved in the production of tissue damage. In support of this was the demonstration of cell-mediated reactivity *in vitro* to salivary or renal antigens in 42% of the patients with Sjogren's syndrome and in 62% of those with renal tubular acidosis, respectively. These findings, together with the frequency and similar pattern of multisystem involvement in the three conditions, suggest a common pathogenetic mechanism, and disordered cellular immune reactions directed primarily against the liver could affect other organs as a result of cross antigenicity.

1491 HISTOLOGICAL CHANGES IN TWO SEROLOGICALLY DEFINED GROUPS OF CHRONIC HEPATITIS.

(E.) Christoffersen, P.; Dietrichson, O.; Nielsen, J. O.; Elling, P. (Commun. Hosp., Copenhagen, Denmark). *Acta Pathol. Microbiol. Scand* [*A*] 81(5):698-702, 1973.

The histological features of 42 consecutive patients with biopsy verified chronic hepatitis and available serum specimens were studied. The patients were divided into two groups: group 1: 12 patients with persistent Au-antigenemia but neither antinuclear antibodies (ANA) nor smooth muscle antibodies (SMA) and group 2: 27 patients without detectable Au-antigen but with ANA and/or SMA. There is a significantly higher incidence of parenchymal inflammation and a significantly higher degree of portal inflammation in group 2 than in groupl, just as there is more pronounced occurrence of plasma cells. A morphological follow-up of 92 percent of the patients shows a significantly more frequent development of cirrhosis in the group with ANA and/or SMA. Significantly elevated values of IgA and IgG occurred in the group with autoantibodies. Abnormal bile duct epithelium is demonstrated only in the group without autoantibodies.

1492 HIGH TITRES OF ANTIBODIES AGAINST RUBELLA AND MORBILLI VIRUS IN PATIENTS WITH CHRONIC HEPATITIS.

(E.) Closs, O.; Haukenes, G.; Blomhoff, J. P.; Gjone, E. (Inst. Exp. Med. Res., Oslo, Norway). *Scand. J. Gastroenterol.* 8(6):523-528, 1973.

The presence of rubella and morbilli haemagglutination-inhibiting antibodies was studied in 40 patients with chronic liver disease. In patients with chronic hepatitis highly elevated titres were found in 12 out of 19 patients, the geometric mean titre of antibodies against both viral antigens being about 8 times that of the control group. Normal titres were found in sera from patients with primary biliary cirrhosis, and titres were only slightly increased in patients with other types of cirrhosis. Linear correlation between viral antibody titres and IgG concentration could not be demonstrated. Possible causes of the observed high titres of rubella and morbilli antibodies include: abnormal amounts of antigen and an abnormal immune response.

1493 SERUM "VIRUS-LIKE" PARTICLES IN CHRONIC HEPATITIS AND CIRRHOSIS: RELATION TO IMMUNOLOGICAL TESTS FOR HEPATITIS B ANTIGEN.

(E.) Jokelainen, P. T.; Krohn, K.; Finlayson, N. D. C.; Prince, A. M. (1st Dept. Pathol., Univ. Helsinki, Finland). *Gastroenterology* 65(5):796-801, 1973.

The sera of 69 patients with chronic hepatitis and cirrhosis were investigated separately for the hepatitis B antigen immunologically and for the electron-microscopic particles associated with that antigen. The antigen was found in 20 cases, and electron microscopic particles were present in 19 of these. Electron-microscopic particles morhpologically indistinguishable from these were found in 5 additional cases where hepatitis B antigen could not be demonstrated. It is possible that the hepatitis B antigen was present, but in amounts too small to detect immunologically, or that these particles did not contain the antigen. Large 430-Å diameter spheres were found in 12 cases, and were significantly associated with the small 200-Å diameter spheres and rods, the large spheres being found alone in only 1 case.

1494 INFUSION OF HEPATITIS-B ANTIBODY IN ANTIGEN-POSITIVE ACTIVE CHRONIC HEPATITIS.
(E.) Reed, W. D.; Cullens, H.; Eddleston, A. L. W. F.; Williams, R.; Zuckerman, A. J.; Peters, D. K.; Williams, D. G.; Maycock, W. D. A. (Lister Inst. Prev. Med., Elstree, England). *Lancet* 7842:1347-1351, 1973.

The effects of infusion of an immunoglobulin preparation with a high titre of antibody to hepatitis-B antigen (HBAg) were investigated in six patients with active chronic hepatitis, in five of whom HBAg was persistently detected in the serum. The intravenous infusions were well tolerated and only two patients showed minor and transient evidence suggesting an immune-complex reaction. One patient developed transient microscopic hematuria 24 hours after treatment; another case showed an increase in proteinuria from 160 to 770 mg/24 hr on the second day. Complexes containing HBAg were demonstrable after the infusion by electron microscopy in four cases, but in three of these complexes were also present beforehand. Complement levels and C3 conversion products were consistent with the presence of immune complexes. Clearance of antigen from the circulation for up to 9 days was achieved in the two cases with low initial titres of HBAg.

1495 THE RELEVANCE OF A SEROLOGICAL CLASSIFICATION OF CHRONIC HEPATITIS. *(E.)*
Dietrichson, O.; Nielsen, J. O.; Elling, P.; Christoffersen, P. (Commun. Hosp., Copenhagen, Denmark). *Acta Pathol. Microbiol. Scand* [*B*] 81(5):519-524, 1973.

Forty-two consecutive patients with biopsy verified chronic hepatitis and available serum specimens were examined for the occurrence of Australia antigen, antinuclear antibodies, smooth muscle antibodies and mitochondrial antibodies. Twleve patients with persistent Australia antigen, but without circulating autoantibodies (group 1) were compared with twenty-seven patients without Australia antigen, but with circulating autoantibodies (group 2). Young males with a history of serum hepatitis were predominant in group 1, while most of the patients in group 2 were middle-aged women with an insidious onset of the disease. The biochemical activity of the liver disease was more pronounced in group 2. There are significantly more patients with hypoalbuminemia in group 2 than in group 1. The values of IgA and IgG were significantly higher in group 2 than in group 1. It is concluded, that the histological defined chronic hepatitis may include several disease entities of which at least two can be separated by the serology. The relevance of this classification is supported by the fact, that there are more patients developing cirrhosis in group 2 than in group 1.

1496 AUSTRALIAN ANTIGEN IN PATIENTS WITH CHRONIC HEPATITIS AND CIRRHOSIS OF THE LIVER.
(Rus.) Loginov, A. S.; Yartseva, A. M.; Perova, S. D. (All-Union Sci. Res. Inst. Gastroenterol., Moscow, USSR). *Vestn. Akad. Med. Nauk SSSR* (3):50-54, 1973.

See also, 1140, 1176, 1471.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

1497 ETHANOL METABOLISM IN 18 SUBJECTS WHO DRINK LARGE QUANTITIES OF ALCOHOL AND HAVE NORMAL LIVER FUNCTION. *(Fr.)* Thomas, M.; El Guedri, H.; Berthaux, N.; Schwarzman, V.; Infante, R. (St. Antoine Hosp., Paris, France). *Biol. Gastroenterol. (Paris)* 6:139-149, 1973.

After 5-45 days (mean 18.8 days) of abstention and ingestion of 0.8 g/kg ethanol diluted in 3 times its volume of water and drunk over a period of 30 min, alcohol metabolism was studied in 18 subjects (17 men and 1 woman, aged 32-73 yr) who had drunk 160-180 g/day (mean 296 g/day) of ethanol for 13-53 yr (mean 30 yr), had no clinical signs of cirrhosis or neurological manifestations of chronic alcoholism, normal or slightly abnormal liver function tests, and essentially normal liver histology (11 had some evidence of fatty liver and 1 of siderosis). Controls consisted of 7 subjects (6 men and 1 woman, aged 33-62 yr) who were nonalcoholics and had no gastrointestinal or liver disease. Although blood alcohol curves followed a similar course in alcoholics and controls, all of the alcoholics had higher blood alcohol peaks and higher ethanol oxidation rates than the controls. In 16 of these 17 subjects the mean blood alcohol peak was 127 mg/100 ml and the ethanol oxidation rate was 226 mg/100 ml/hr compared with 76 mg/100 ml and 161 mg/100 ml/hr, resp. for controls. The remaining alcoholic, a 71-yr-old man with gastritis who had drunk an average of 8 liters/day of wine (10% ethanol) for at least 50 yr, had a much higher initial blood alcohol level and blood alcohol peak than the others. No significant differences in liver alcohol dehydrogenase (ADH) activities, the ADH isoenzyme distribution, or plasma lipid fractions were found between alcoholics and controls. The most plausible explanation for these findings in alcoholics with normal liver function is a relative impermeability of cell membranes to alcohol. It is also suggested that the transformation of acetaldehyde into acetate may be increased in the cytoplasm of these subjects.

1498 PROLONGED ADMINISTRATION OF ETHANOL TO YOUNG, HEALTHY VOLUNTEERS: EFFECTS OF BIOCHEMICAL, MORPHOLOGICAL AND NEUROPHYSIOLOGICAL PARAMETERS. *(E.)* Belfrage, P.; Berg, B.; Cronholm, T.; Elmqvist, D.; Hagerstrand, I.; Johansson, B.; Nilsson Ehle, P.; Norden, G.; Sjovall, J.; Wiebe, T. (Dept. Physiol. Chem., Univ. Lund, Sweden). *Acta Med. Scand.* [*Suppl.*] 552:1-44, 1973.

1499 HEPATIC AND CARDIAC PROTEIN SYNTHESIS. ALCOHOL VS NUTRITION. *(E.)* Rothschild, M. A.; Schrieber, S. S.; Oratz, M. (VA Hosp., New York, N.Y.). *N.Y. State J. Med.* 73(24):2887-2890, 1973.

LIVER AND BILIARY TRACT

Cirrhosis

1500 HEPATIC BLOOD FLOW, PORTAL HYPERTENSION, AND LIVER FAILURE IN PATIENTS WITH ALCOHOLIC CIRRHOSIS. *(Fr.)* Lebrec, D.; Sicot, C.; Benhamou, J. P. (Beaujon Hosp., Clichy, France). *Arch. Fr. Mal. App. Dig.* 62(6):465-471, 1973.

Hepatic blood flow was measured with the indocyanine green technique in 37 chronic alcoholics, aged 36-64 yr, with cirrhosis and in 10 patients, aged 30-50 yr, with no evidence of portal hypertension or liver disease. Since the indocyanine green technique is subject to serious error when indocyanine green extraction is low, 10 patients with extraction values of 20% or lower were excluded from the study. Of the 27 remaining patients, 9 had end-to-side portocaval anastomoses and 8 others were studied before and after shunt surgery. Values for the plasma clearance and extraction of indocyanine green and hepatic blood flow were significantly lower in cirrhotics than in controls. Among the cirrhotics there was no significant correlation between the decrease in hepatic blood flow and the increase of the gradient between blocked and free subhepatic pressures or between hepatic blood flow and the presence of liver failure. Liver failure is arbitrarily defined as the persistence of jaundice and/or ascites and/or encephalopathy for more than 3 months, and/or a serum albumin concentration less than 30 g/liter, and/or a Quick time of more than 20 sec. No correlation was found between hepatic blood flow measured before shunt surgery and the development of liver failure one yr after surgery. The creation of a portocaval anastomosis had no appreciable effect on the gradient between blocked and free subhepatic pressure or indocyanine green extraction. The plasma clearance of indocyanine green hepatic blood flow were significantly decreased both before and after shunt surgery. No significant relation was found between hepatic blood flow measured 30-40 days after shunt surgery and the development of liver failure one yr after surgery. These findings indicate that there is no correlation between the decrease in hepatic blood flow and the severity of portal hypertension or liver failure. Measurement of hepatic blood flow before surgery is of no value in predicting whether surgery will benefit the patient. Shunt surgery does decrease hepatic blood flow, but there is no relation between the extent of this decrease and the benefit of surgery.

1501 ASSOCIATION OF SCLERODERMA, SJOGREN'S SYNDROME, AND PRIMARY BILIARY CIRRHOSIS. *(Fr.)* Levrat, M.; Descos, L.; Trepo, C.; Vandenput, F.; Lesbros, F.; Moulin, G.; Berthelemy, C. (Edouard Herriot Hosp., Lyon, France). *Arch. Fr. Mal. App. Dig.* 62(6):495-500, 1973.

A 56-yr-old woman with a 31-yr history of Raynaud's phenomenon presented with calcinosis cutis, Sjogren's syndrome, telangiectasias, and scleroderma. Chronic diarrhea was found to be caused by an abnormally large number of *Escherichia coli* in the small intestine whose growth was favored by histamine-resistant achlorhydria. Liver function tests were normal except for an increase in serum alkaline phosphatase activity. Three yr later the patient was hospitalized with signs of cirrhosis. On the basis of an increase in the antimitochondrial antibody titer and cholestatic changes found in a liver biopsy, a diagnosis of primary biliary cirrhosis was established. Tests for Australia antigen and lupus erythematosus cells were negative, but thyroid and parietal cell autoantibodies were found in the serum. These findings suggest that cirrhosis developed on a background of chronic hepatitis. Although some associations of cleroderma with primary biliary cirrhosis or Sjogren's yndrome have been reported in the literature, this s believed to be the first report of a patient with ll three of these conditions.

502 ROLE OF A FALSE NEUROTRANSMITTER, OCTOPAMINE, IN THE PATHOGENESIS OF HEPATIC AND ENAL ENCEPHALOPATHY. *(E.)* Lam, K. C.; Tall, A. .; Goldstein, G. B.; Mistilis, S. P. (Roy. Prince lfred Hosp. Camperdown, Australia). *Scand. J. astroenterol.* 8(6):465-472, 1973.

he role of false neurotransmitters in the pathoenesis of hepatic encephalopathy was investigated y assay of octopamine in the serum and urine of 25 atients. Serum levels and urinary excretion of ctopamine were elevated in all patients with hepatic ncephalopathy. There was a statistically signifiant correlation between the degree of encephalopathy nd serum and urine octopamine values, and in 10 paients with hepatic encephalopathy studied on 2 or ore occasions, octopamine levels paralleled variaions in mental state. In patients with primary enal disease and no liver disease, renal failure er se caused elevations of urine and serum octopaine. In patients with liver disease with secondary mpairment of renal function, rising serum octopaine levels correlated significantly with decreasing lomerular filtration rate and maximal urine flow ate. Elevated levels of false neurotransmitters uch as octopamine seem to be an important factor in he pathogenesis of hepatic encephalopathy, but heir role in renal impairment secondary to liver isease remains undetermined.

503 LYMPHOCYTE TRANSFORMATION BY PHYTOHAEMAGGLUTININ (PHA) AND PURIFIED PROTEIN DERIVAIVE (PPD) IN PRIMARY BILIARY CIRRHOSIS: EVIDENCE F SERUM INHIBITORY FACTORS. *(E.)* Macsween, R. N. .; Thomas, M. A. (West. Infirm., Glasgow, Scotland). *lin. Exp. Immunol.* 15(4):523-533, 1973.

actors inhibitory to lymphocyte transformation *in itro* by phytohaemagglutinin (PHA) and purified rotein derivative (PPD) have been demonstrated in he majority of sera from 11 patients with primary iliary cirrhosis. These factors inhibited transormation in response to PHA both of autologous ymphocytes, and of 'reference' lymphocytes, obained from a single donor, a healthy medical member f the laboratory staff known to be strongly Manoux positive. 'Reference' lymphocyte transformaion in response to PPD was significantly less when ultured in sera from both primary biliary cirrhosis atients and control subjects than when cultured in B serum. The investigation suggests that in primary iliary cirrhosis there is an intrinsic impairment f lymphocyte responsiveness to PHA, and that, in ddition, extrinsic serum factors inhibitory of PHA ransformation are present.

504 CHOLIC ACID SYNTHESIS AS AN INDEX OF THE SEVERITY OF LIVER DISEASE IN MAN. *(E.)* cCormick, III, W. C.; Bell, C. C., Jr.; Swell, L.; Vlahcevic, R. Z. (Health Sci. Div., Virginia Commonwealth Univ., Richmond). *Gut* 14(11):895-902, 1973.

Bile acid pool size and kinetics were determined in 17 patients with cirrhosis and 11 patients without liver disease and correlated with the severity of liver disease as determined by a grading system which assigned numerical values to various clinical signs and laboratory results. The total clinical score and the patients were divided into two groups of advanced (7-18 points) or mild (1-6 points) cirrhosis. The clinical rating was then correlated with the various aspects of bile acid metabolism. Cholic acid synthesis was markedly reduced in the early stages of cirrhosis and continued to decrease with the advancement of the liver disease. There was an inverse correlation between synthesis of cholic acid and the severity of cirrhosis. Nine of the 10 patients with advanced cirrhosis and a very low cholic acid synthetic rate (average 68 mg per day) died within one to 13 months from the start of the study. Patients with mild cirrhosis also had significantly reduced cholic acid synthesis (average 152 mg per day) but they all were well and alive three to 23 months after the study. In contrast, chenodeoxycholic acid synthesis was not markedly affected in either patients with mild or advanced cirrhosis. There was also a high degree of correlation between the fractional daily turnover rate of cholic acid and the severity of liver disease. The fractional daily turnover rate of cholic acid was greatly reduced (50%) in patients with advanced cirrhosis. Deoxycholic acid was reduced in patients with mild cirrhosis and virtually absent from the bile of patients with advanced cirrhosis. Cholic acid synthesis is a sensitive indicator of the hepatocellular damage; chenodeoxycholic acid synthesis is relatively unaffected by cirrhosis. The selective alteration in cholic acid synthesis probably resides in a deficiency of one or more enzymes regulating the formation of the 3-keto, 7 alpha, 12 alphadihydroxy precursor of cholic acid.

1505 REGIONAL VARIATIONS IN HEPATIC BLOOD FLOW AND FUNCTION IN MAN. *(E.)* Strandell, T.; Erwald, R.; Kulling, K. G.; Lundbergh, P.; Marions, O.; Wiechel, K. (St. Erik's Hosp., Stockholm, Sweden). *Acta Med. Scand.* 194(3):215-218, 1973.

Four male patients were studied with regard to arterio-hepatic venous extraction of oxygen and Indocyanine Green dye (ICG). Two patients with alcoholic cirrhosis of the liver had an atrophic right and a hypertrophic left liver lobe. They also had higher extractions of oxygen and ICG over the right than over the left lobe, most pronounced for ICG. The two other patients, one with an extrahepatic biliary stasis and one with a chronic pancreatitis, had livers of normal size and configuration. They displayed no regional differences in extraction of oxygen, but one of them had a lower extraction of ICG over the right than over the left hepatic lobe. The findings in the patients with cirrhosis might be explained by regional variations in metabolic rate and hepatic cell function in relation to blood flow, and possibly also by shunts from the portal vein to the hepatic veins of the left lobe. Total hepatic blood flow cannot be estimated with sufficient accuracy by the Bradley technique in patients in whom the hepatic extraction of the substance used is low and large regional variations in extraction may occur.

1506 CIRRHOSIS FOLLOWING METHOTREXATE ADMINISTRATION FOR PSORIASIS. *(E.)*

Coughlin, G. P.; Henderson, D. W.; Reid, J. G.; Grant, A. K. (Queen Elizabeth Hosp., Adelaide, Australia). *Med. J. Aust.* 2(10):499-501, 1973.

The case history of a 52-year-old female who developed cirrhosis following the administration of methotrexate for psoriasis is presented. She received continuous methotrexate therapy for 3 yr varying from 2.5 to 7.5 mg daily. There was no past history of hepatitis; alcohol intake had been negligible. Liver biopsy revealed considerable distortion of hepatic architecture; portal tracts contained increased fibrous tissue, which linked adjacent triads and in some areas appeared to surround regeneration nodules. Fatty change was not present, stainable iron was not increased, and there was no evidence of malignant change. The appearances were consistent with micronodular cirrhosis. Methotrexate therapy was discontinued and a further assessment was made 6 months later. A second liver biopsy demonstrated moderate distortion of hepatic architecture by bands of fibrous tissue with a tendency to link adjacent portal tracts. Scattered chronic inflammatory cells were present. Regeneration nodules were present, but these were not uniform throughout the biopsy. This patient illustrates the development of severe portal fibrosis, with sufficient features for a diagnosis of cirrhosis. Six months after withdrawal of this drug there was no significant alteration in hepatic size or histological appearance. Biochemical tests of liver function, which were initially only mildly impaired, also showed no significant change after this period. It is considered that the patient may have permanent liver damage.

1507 IDIOPATHIC PORTAL HYPERTENSION, MANIFESTATION OF A MORE GENERALIZED VASCULAR DISEASE? CASE REPORT. *(E.)*

Stalder, G. A.; Burckhardt, D.; Bianchi, L. (Univ. Med. Polyclin, Basel, Switzerland). *Helv. Med. Acta* 37(4):281-290, 1973.

A case report is presented of a 39-yr-old patient with idiopathic portal hypertension. The histology of a blind liver biopsy and of 3 biopsies from the hepatic hilus during the performance of a portocaval shunt showed a regular lobular pattern of the liver tissue with some slightly enlarged portal tracts. The chest X-ray showed a heart of normal size and configuration; the elctrocardiogram was normal. On right heart catheterization, the liver wedge pressure was slightly elevated (12.5 mm Hg). The right ventricular pressure tracing showed an early-diastolic dip with plateau formation. The patient suffered repeated episodes of bleeding from esophageal varices and a side-to-side portocaval shunt was performed. During a second cardiac catheterization the only abnormal finding at rest was a slightly elevated end-diastolic pressure. The possibility of a correlation between the portal vein changes in idiopathic portal hypertension and pathological process of the endocardium is considered. Toxic substances resorbed from the intestine pass to the liver and could account for the mural changes in the portal vein branches. The resulting portal hypertension causes a collateral circulation leading splanchnic blood directly to the right heart by-passing the liver. Through the collaterals, the substance causing the modifications in the portal vein branches or other toxic or humoral substances could be responsible for the damage of the endocardium. The patient had close professional contact with the following chemicals which could be the causative toxic substances: vinyl-chloride, propyl-alcohol, tetrachlor-ethylene, trichlor-ethylene, hydrochinone, hexachlorcyclohexane, methylene-chloride, and frigenes. It is possible that the idiopathic portal hypertension is a manifestation of a rather generalized venous vascular process.

1508 LIVER INJURY WITH METHOTREXATE THERAPY FOR PSORIASIS. *(E.)*

Podurgiel, B. J.; McGill, D. B.; Ludwig, J.; Taylor, F.; Muller, S. (Mayo Grad. Sch. Med., Rochester, Minn.). *Mayo Clin. Proc.* 48(11):787-792, 1973.

Liver biopsies from 33 patients with severe psoriasis were reviewed and the findings correlated with methotrexate dosage schedules. There was a significant positive association with frequency of administration. Fibrosis and cirrhosis (found in 8 of 33 patients) occurred only in those taking methotrexate for more than 12 days per month. Of the 25 patients without these lesions, only 3 had methotrexate 12 days per month or more. These findings suggest that methotrexate may be significantly hepatoxic when given frequently, but the drug may be safely given weekly for a period up to 4 yr.

1509 HEPATIC BILIRUBIN TRANSPORT IN NORMAL AND CIRRHOTIC SUBJECTS BY COMPARTMENTAL ANALYSIS OF THE PLASMA CLEARANCE CURVE AFTER INTRAVENOUS LOADING. *(Fr.)*

Pirotte, J. (Baviere Hosp., Liege, Belgium). *Biol. Gastroenterol. (Paris)* 6(3):183-196, 1973.

Fasting plasma clearance of bilirubin was investigated in 18 patients with cirrhosis and in 24 normal controls after administration of unconjugated bilirubin (2 mg/kg i.v.). In both normal and cirrhotic subjects the plasma clearance curve for bilirubin was biexponential and consisted of a slow and rapid component. The most plausible model compatible with the equation derived for these curves is a 3-compartment model in which plasma bilirubin (compartment 1) is in reversible equilibrium with a hepatic receptor pool (compartment 2). Irreversible bilirubin clearance occurs from compartment 2 to a secretory hepatocyte compartment (compartment 3). This irreversible step is associated with intrahepatic conversion of nonconjugated into conjugated bilirubin. Depending upon whether the plasma extraction coefficient, *ke*, was normal or decreased, cirrhotics were divided into groups. All of those with *ke* values less than .009 had increased nonconjugated bilirubin levels, hile only 2 of the 12 had increased conjugated bili-ubin levels. These findings suggest that cirrhotics ith decreased plasma extraction of bilirubin may ave an impairment of conjugation and increased re-lux of unconjugated bilirubin from the liver towards he plasma.

510 FUNCTIONAL RENAL INSUFFICIENCY IN CIRRHOTICS. DEVELOPMENT. MECHANISM. TREATMENT. *Fr.)* Vesin, P. (no affil.). *Arch. Fr. Mal. App. ig.* 61(12):775-786, 1972.

511 BONES IN CIRRHOTICS STUDIED BY QUANTITATIVE READING OF THE BONE BIOPSY. *(Fr.)* leunier, P.; Dechavanne, M.; Prost, G.; Edouard, C.; ernard, J.; Courpron, P.; Tolot, F. (Rheumatol. lin., Bernard Univ., Lyon, France). *Lyon Med.* 29(11):1089-1095, 1973.

512 THE IMMUNOGLOBULIN SYSTEM IN CIRRHOSIS OF THE LIVER - EXPRESSION OF AN AUTOIMMUNE IECHANISM. *(Ger.)* Schneiderbaur, A.; Schuster, F. State Hosp., Vienna, Austria). *Wien. Klin. ochenschr.* 85(18):288-296, 1973.

513 EFFECT OF CERVICAL LYMPHOVENOUS ANASTOMOSIS IN TREATING PATIENTS WITH PORTAL HY-ERTENSION FOLLOWING LIVER CIRRHOSIS, WITH A 3 1/2 EAR FOLLOW-UP. *(Ger.)* Renger, F.; Platzbecker, .; Walther, M.; Ermisch, H.; Dokert, B.; Kobe, E. C. G. Carus Acad. Med., Dresden, Germany). *Z. esamte Inn. Med.* 28(7):203-206, 1973.

514 ON THE PHARMACOKINETICS OF THIAMPHENICOL. I. BEHAVIOUR IN ACUTE AND CHRONIC HEPATIC INSUFFICIENCY. *(Ger.)* Menz, H. P.; Bezler, H. J.; artmann, I.; Oldershausen, H. F. (Med. Clin. Univ., ubingen, Germany). *Arzneim. Forsch.* 4(1):99-102, 1974.

515 CARBOHYDRATE REGULATION DISORDERS ASSOCIATED WITH CIRRHOSIS. *(Fr.)* Bernard, . M.; Fenasse, R.; Raynaut, C.; Gauthier, A. (no ffil.). *J. Med. Lyon* 54(1241):121-126, 1973.

1516 CHANGES IN BLOOD OXYGENATION DURING DIFFERENT STAGES IN THE DEVELOPMENT OF CIRRHOSIS IN THE ADULT (111 CASES). *(Fr.)* Rachail, M.; Corallo, J.; Paramelle, B.; Ledru, J. (Med. Clin. B., Grenoble C.H.R. La Tronche, France). *J. Med. Lyon* 54(1241):77-98, 1973.

1517 HYPOCALCEMIA IN CIRRHOSIS AND DISORDERS IN HEPATIC METABOLISM OF VITAMIN D. *(Fr.)* Darnis, F. (Beaujon Hosp., Paris, France). *Nouv. Presse Med.* 2(37):2443-2445, 1973.

1518 HEPATIC REVASCULARIZATION RESULTING FROM DIRECT ARTERIAL IMPLANTATION. *(Sp.)* Cutropia, J. C.; Keil, J.; Coratolo, F.; Riba, A.; Guinazu, A.; Navarro, A.; Bianchi, M.; delle Donne, G. (Mendoza Spanish Hosp., Argentina). *Rev. Esp. Enferm. Apar. Dig.* 41(1):21-32, 1973.

1519 IDIOPATHIC PORTAL HYPERTENSION. *(Sp.)* Alberola, V.; Penarroja, J.; Marin, J.; Pascual-Leone, A.; Labios, M.; Brotons, B. (Fac. Med., Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(2):169-176, 1973.

1520 HAVE CLASSICAL VASCULAR ANASTOMOSES LOST THEIR VALUE IN THE TREATMENT OF PORTAL HYPERTENSION OF HEPATIC ORIGIN? SELECTIVE SPLENORENAL DECOMPRESSION. EXPERIENCE WITH EIGHT CASES. *(Sp.)* Moreno Gonzalez-Bueno, C.; Gonzalez Cajigal, R.; Banet Diaz, R. (Jimenez Diaz Fdn., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(4):415-428, 1973.

1521 PRIMARY BILIARY CIRRHOSIS. *(Fr.)* Sicot, C.; Benhamou, J. P. (Beaujon Hosp., Clichy, France). *Rev. Fr. Gastroenterol.* (85):41-44, 1973.

See also, 1109, 1163, 1490, 1493, 1496.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

522 RADICAL SURGERY OF CARCINOMAS OF THE INTRAHEPATIC BILE DUCTS. *(Fr.)* Alexandre, . H.; Petite, J. P.; Germain, M.; Chevalley, J.; oilleux, F. (Broussais Hosp., Paris, France). *hirurgie* 99(6):356-363, 1973.

Case reports are presented for 2 patients who were successfully operated on for carcinomas of the intrahepatic bile ducts. Both a 64-yr-old man and a 57-yr-old man presented with obstructive jaundice, and liver biopsies showed the presence of cholestasis.

At laparotomy these patients had tumors near and at, resp. the junction of the 2 major bile trunks in the liver. In addition, the second patient had a large stone and a diverticulum in his gallbladder. No metastases were present in either case. The first tumor involved the cystic, but not the hepatic, duct and was removed by *en bloc* resection of the liver. The second tumor invaded the portal and periportal region, passed into the parenchyma, was accompanied by perineural infiltration, and caused thrombosis of the portal vein. In this case a left hepatectomy was performed, the gallbladder was removed, and the flow of bile was restored with a Y-shaped loop of jejunum. Histological examinations revealed that the first tumor was an epithelioma and the second, a clear cell adenocarcinoma. It is recommended that radical surgery be performed on patients with tumors of the intrahepatic bile ducts, provided that no metastases are present. Literature reports indicate that some patients have relatively long survivals, compared to those who undergo palliative surgery, and remain relatively free of pain. No follow-ups are reported for these 2 patients.

1523 THE EFFECT OF CHOLECYSTECTOMY ON BILE SALT METABOLISM. *(E.)* Pomare, E. W.; Heaton, K. W. (Roy. Infirm., Bristol, England). *Gut* 14(10): 753-762, 1973.

Isotopic bile salt studies were performed in 13 cholecystectomy patients and 10 matched controls using labelled taurocholate and deoxycholic acid. Cholecystectomy subjects had reduced pools of both primary bile salts, cholate and chenodeoxycholate, while the deoxycholate pool remained normal in size. As a result of these changes, the total bile salt pool was reduced to almost half its normal size and deoxycholate became the predominant bile salt. The half-life of taurocholate was reduced but, because its pool size was diminished, the daily synthesis of taurocholate remained normal. There was accelerated transfer of ^{14}C from taurocholate-24-^{14}C to its metabolites in bile, especially deoxycholate conjugates. In 4 subjects studied pre- and postoperatively similar changes occurred in all the above parameters. The bile salt pool circulated during fasting as well as during digestion. The consequences of this are increased exposure of bile salts to intestinal bacteria and hence increased bacterial degradation; continuous passage of the bile salt pool through the liver, and therefore continuous and presumably enhanced feedback inhibition of hepatic bile salt synthesis. The reservoir function of the gallbladder influences the size, kinetics, metabolism, and composition of the bile salt pool. It is concluded that no study of bile salt metabolism is complete without some assessment of gallbladder status.

1524 EFFECT OF ORAL CHENODEOXYCHOLIC ACID ON BILE ACID KINETICS AND BILIARY LIPID COMPOSITION IN WOMEN WITH CHOLELITHIASIS. *(E.)* Danzinger, R. G.; Hofmann, A. F.; Thistle, J. L.; Schoenfield, L. J. (Mayo Clin., Rochester, Minn.). *J. Clin. Invest.* 52(11):2809-2821, 1973.

Bile acid kinetics and biliary lipid composition were characterized in 6 women with gallstones before and after 6 months of oral therapy with chenodeoxycholic acid, an agent that induced dissolution of cholesterol gallstones in man. Over a dosage range of 1-4 g/day, absorption varied from 0.8 to 2.3 g/day. The chenodeoxycholic acid pool expanded two- to sixfold, and bile became composed predominantly (> 90%) of chenodeoxycholic acid conjugated chiefly with glycine. Cholic acid and deoxycholic acid pools decreased markedly, so that the total bile acid pool expanded much less, about twofold on the average. Cholic acid synthesis decreased in 5 of the 6 patients, consistent with negative feedback inhibition of cholic acid synthesis by chenodeoxycholic acid. In 4 patients whose bile was above or close to saturation with cholesterol, the bile became unsaturated; in 2 patients, whose bile was unsaturated, it remained so. In 5 patients with radiolucent gallstones, chenodeoxycholic acid therapy was continued after completion of kinetic and composition measurements; the stones decreased in size or dissolved entirely during the subsequent 6 to 18 months. Similar measurements of bile acid kinetics and biliary lipid composition were made before and after a 6-month period without medication in a control group of 6 healthy women; no changes occurred.

1525 DUODENAL OBSTRUCTION CAUSED BY GALLSTONES: REPORT OF SIX CASES. *(E.)* Printen, K. J.; Safaie-Shirazi, S. (Univ. Iowa Hosp., Iowa City). *Am. Surg.* 39(12):688-691, 1973.

Six case histories of duodenal obstruction caused by gallstone are presented. Characteristic symptoms and signs in these patients are bilious vomiting, distension in the epigastric area and its disappearance after each vomiting, a previous history of gallbladder disease, and roentgenographic findings of air in the biliary tree and absence of small bowel distension with a distended stomach. Three criteria are advocated: removal of the stone, removal of the fistulous tract and cholecystectomy, either in single or multiple staged procedures depending upon the condition of the patient and the experience of the operating surgeon.

1526 GALLBLADDER VOLUME AND CONTRACTILITY AFTER TRUNCAL, SELECTIVE AND HIGHLY SELECTIVE (PARIETAL-CELL) VAGOTOMY IN MAN. *(E.)* Parkin, G. J. S.; Smith, R. B.; Johnston, D. (General Infirm., Leeds, England). *Ann. Surg.* 178(5):581-586, 1973.

The resting volume of the gallbladder, and its contraction after a normal meal, were studied by means of oral cholecystography in patients with duodenal ulcer before operation, and in patients who were in good health more than 1 year after truncal, selective or highly selective (parietal-cell) vagotomy. Truncal vagotomy led to significant dilatation ($p < 0.01$) of the gallbladder. Selective and highly selective vagotomy, both of which preserve the hepatic vagal fibers, were not followed by dilatation of the gallbladder. Contractility of the gallbladder

s unimpaired after each of the 3 types of vago-
my. It is suggested that function of the biliary
act in man may be better after highly selective
gotomy than after truncal vagotomy.

27 MICRO-GALLBLADDER AND BILIARY CALCULI IN MUCOVISCIDOSIS. *(E.)* Rovsing, H.; Sloth,

(Rigshosp., Copenhagen, Denmark). *Acta Radiol.*
(5):588-592, 1973.

diologic examination of the biliary tract was per-
rmed in 41 cystic fibrosis patients (16 females and
males, aged 6 months to 23 yr). The gallbladder
s considered normal in size in 22 patients, in 17
llowing cholecystography and in 5 only after chole-
aphy. In 6 patients it was definitely abnormal in
ze. The small gallbladders were not related to
e relative size of the patients. The outline was
gular in all the gallbladders, including the micro-
llbladders, and all contracted normally after a
tty meal. Gallstones were present in 1 patient
d probable in a second. In 11 of the patients no
lling or only partial demonstration of the biliary
act was obtained. Occlusion of the main biliary
act was excluded as the serum bilirubin was normal
all patients. Whether absence of contrast filling
related to known liver lesion or to biliary tract
thology in cystic fibrosis remains doubtful. The
ten elevated values of transaminases and alkaline
osphatases could not be significantly correlated
abnormal cholecystography or cholegraphy.

28 A STEREOLOGICAL STUDY OF INTRAHEPATIC BILE DUCTS. 2. BILE DUCT PROLIFERATION IN SOME THOLOGICAL CONDITIONS. *(E.)* Jorgensen, M. (Univ.

st. Pathol. Anat., Copenhagen, Denmark). *Acta*
thol. Microbiol. Scand. [*A*] 81(5):663-669, 1973.

le duct proliferation in 5 pathological conditions
s investigated in a stereological study of intra-
patic bile ducts. One hundred sectioned bile
cts chosen at random from each case are drawn on
acing paper. The long diameter (l) and the short
ameter (w) of these profiles are measured in mm.
e axial ratio q = w divided by l is calculated
r each profile. The profiles are grouped accor-
ng to their shape (q). The resulting percentage
stribution of axial ratios is compared with the
eoretical distributions of different cylinder
apes. The proliferating ductules are not small
ort and blindly-ending tubes connected with the par-
chyme. Nor, in this reconstruction, do they seem to
shoots from the original ductal system in the
rtal tract. They form a network with several con-
ctions to the parenchyma. The ductules are flat-
ned. The direction of flatness does not have any
[illegible] orientation, but varies in the network.

29 THE GALLBLADDER AS A CONDUIT BETWEEN THE LIVER AND INTESTINE. *(E.)* Waddell, W.

; Grover, F. L. (Univ. Colorado Med. Ctr., Denver).
rgery 74(4):524-529, 1973.

aumatic injury in a 16-yr-old girl forced cancellation of a needed end-to-end suture of the distal common duct to the dilated left hepatic duct over a T tube, because tissue loss, scaring, and infection resulting from the injury made it impossible to bring the right and left ducts together. Instead, the right hepatic duct was anastomosed to the gallbladder. In 3 other patients (2 men and 1 woman, aged 40-52 yr) the gallbladder was anastomosed to the common hepatic duct for palliation of inoperable carcinoma of the pancreas. The method might also prove useful for hepatic transplantation. These anastomoses are relatively easy to perform for they are made large and no tension exists. Also, the right hepatic duct and the upper common hepatic duct are in juxtaposition to the gallbladder. It is felt that since the common bile duct immediately below the bifurcation is about as far from tumor in the head of the pancreas as an anastomosis can be placed, this should lengthen the interval between operation and tumor extension causing recurrent biliary obstruction. This method avoids using a cholecystoduodenostomy when a low entering cystic duct has been ligated, divided, or otherwise obstructed. No reverse flow through the cystic duct occurs, thus eliminating extrahepatic obstruction at the cystic duct level from rejection or infection. No tubes or drains are required. This procedure also has the advantage of allowing the proximal anastomosis to be made with 2 openings the same size with tissues of approximately the same thickness.

1530 A STEREOLOGICAL STUDY OF INTRAHEPATIC BILE DUCTS. 3. INFANTILE POLYCYSTIC DISEASE. *(E.)* Jorgensen, M. (Univ. Inst. Pathol. Anat., Copenhagen, Denmark). *Acta Pathol. Microbiol. Scand.* [*A*] 81(5):670-675, 1973.

Liver tissue from 10 newborn infants, all stillborn or dying shortly after birth was studied by stereology to investigate the validity of the conception of the intrahepatic biliary system obtained from 2 reconstructions. In all the cases, both kidneys were considerably enlarged and transformed into cystic and spongelike structures. All the livers were grossly normal except one which displayed a multitude of cysts. One hundred sectioned bile ducts, chosen at random from each of the cases, were drawn on tracing paper. For each of the numbered profiles, the length (l) and the width (w) were measured in mm. For each profile, the axial ratio q=w divided by l was calculated. The percentage distribution of profile shapes (q) is compared with the distribution of known geometric shapes. The spread in distribution of axial ratios among the 10 cases is quite pronounced compared to that of normal liver ducts and bile duct proliferation. Ductal populations are composed primarily of straight cylinders and secondarily of a mixture of flat elliptical cylinders called ductal plates and of irregular tubular structures approximating the shape of circular cylinders. The 2 components show no preferential widths. The structures are dilated compared to normal ducts, but in a very variable manner, and cysts are rare. It is concluded that the mixture of different ductal shapes constitutes a characteristic entity.

1531 SPONTANEOUS ENTEROBILIARY FISTULAS. *(E.)* Safaie-Shirazi, S.; Zike, W. L.; Printen, K. J. (Coll. Med., Univ. Iowa, Iowa City). *Surg. Gynecol. Obstet.* 137(5):769-772, 1973.

Spontaneous enterobiliary fistulas present in 92 patients (70 females and 22 males, aged 60-79 yr) studied along with the signs and symptoms and modalities of therapy according to the type of fistula. Cholecystoduodenal fistula was present in 70 patients, cholecystocolic fistula in 10, cholecystogastric fistula in 5, choledochoduodenal fistula in 4, and cholecystocholedochal fistula in 3. The majority of patients suffered pain in the right upper quadrant, nausea, vomiting and fatty food intolerance. Diarrhea was the major complaint of 3 of 10 patients with cholecystocolic fistulas and significant weight loss occurred in 3 of 5 cholecystogastric fistula patients. Of the 92 patients, 40 had gallstone ileus; all 40 had cholecystoduodenal fistulas. Of the remaining 52 patients, 47 underwent operation: 45 had a cholecystectomy and repair of fistulas; 2 had operations to control duodenal ulcer disease. Small contracted gallbladders were present in 45 patients with stones in 31. Multiple stones were found in 19 of 25 patients who underwent common bile duct exploration. Cholangitis was present in 16, biliary cirrhosis in 10. The overall mortality rate was 15.2%. Operative mortality rate was 13%. Patient histories included reports from 87% of these patients concerning 2 to 10 previous episodes of pain in the right upper quadrant from 6 months to 20 yr prior. Jaundice had been present in 32 patients previously and was present in 48 at admission. Air or barium in the biliary tree was found in only 31 of these 92 patients. It is suggested that this condition may be avoided by a more vigorous approach to cholecystitis and lithiasis.

1532 EFFECT OF DIETS WITH DIFFERENT FAT CONTENT ON THE BILE LIPIDS COMPLEX IN PATIENTS WITH CHRONIC HEPATITIS AND CHOLECYSTITIS. *(Rus.)* Beiul, E. A.; Shakhovskaia, A. K. (Inst. Nutrition, Moscow, USSR). *Vopr. Pitan.* (5):38-42, 1973.

1533 VALUE OF PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY IN "INSTITUTIONAL JAUNDICE". *(E.)* Franklin, R. H.; Sawyers, J. L. (Vanderbilt Univ. Sch. Med., Nashville, Tenn.). *Am. Surg.* 39(12):673-680, 1973.

1534 PRIMARY GANGRENOUS CHOLECYSTITIS IN CHILDHOOD. *(E.)* Sharma, C. M. P. (West Wales Gen. Hosp., Carmethen). *J. R. Coll. Surg. Edinb.* 18(8):373-375, 1973.

1535 GAS-CONTAINING GALLSTONES. *(E.)* Barnett, J. C.; DeVito, N. J. (Radiol. Hlth. Service, Huntington, N. Y.). *N. Y. State J. Med.* 73(24):2904-2905, 1973.

1536 ONE HUNDRED CASES OF SPHINCTEROTOMY FOR EXTRA-HEPATIC BILIARY LESIONS. *(Fr.)* Suirf, P.; Clert, M.; Nguimbous, J. F. (Georges-Renon Hosp., Niort, France). *Chirurgia* 99(4):233-239, 1973.

1537 SUTURE GRANULOMAS AS A CAUSE OF POLYCHOLECYSTECTOMY SYNDROME. *(Ger.)* Kovarik, V.; Hrdina, R.; Kvasnicka, J. (Prachatice Hosp., Czechoslovakia). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 119(6):766-767, 1973.

1538 CLINICAL VALUE OF A NEW CHOPHYTOL PREPARATION IN HEPATOLOGY. *(Fr.)* Louis, J.; Rosan, G.; Girard, M. (no affil.). *J. Med. Lyon* 54(1245):419-438, 1973.

1539 NONLITHIASIC DISEASES OF THE GALLBLADDER. *(Fr.)* Sambin, P. (no affil.). *J. Med. Lyon* 54(1248):611-621, 1973.

1540 REOPERATIONS ON THE COMMON BILE DUCT. *(Fr.)* Hepp, J. (no affil.). *J. Med. Strasbourg* 4(1):9-19, 1973.

1541 REOPERATIONS ON THE BILIARY TRACT. *(Fr.)* Arianoff, A. A. (St. Elisabeth Clin., Univ. Louvain, Belgium). *J. Med. Strasbourg* 4(1):21-26, 1973.

1542 STATISTICAL ANALYSIS OF 220 REOPERATIONS ON THE BILIARY TRACT. *(Fr.)* Salembier, Y. (no affil.). *J. Med. Strasbourg* 4(1):27-32, 1973.

1543 EFFECT OF STIMULATING THE GASTROINTESTINAL TRACT ON GASTRIC JUICE ACIDITY. *(Rus.)* Vishnevskii, A. A.; Livshits, A. V.; Khrushcheva, E. A.; Karvonidi, N. G.; Kolnachkov, V. A. (A. V. Vishnevskii Inst. Surg., Moscow, USSR). *Lab. Delo* (8):507-508, 1973.

1544 GALLBLADDER DISEASE: 55 CASES. *(Fr.)* Salembier, Y.; Houcke, M. (no affil.). *Lille Med.* 18(6):680-684, 1973.

1545 THE USE OF RADIOLOGICAL MONITORING DURING SURGERY IN 191 GALLBLADDER ANASTOMOSES. *(Fr.)* Mallet-Guy, P. (no affil.). *Lyon Chir.* 69(5):339-341, 1973.

1546 THOUGHTS ON LITHIASIS OF THE AMPULLA OF WATER. *(Fr.)* Frank, P.; Eisenbeth, R.; Wolff, R.; Levy, J. G. (no affil.). *Lyon Chir.* 69(5):343-346, 1973.

547 THE OBSTRUCTIVE CARCINOMA AT THE SITE OF CONFLUENCE OF THE HEPATIC DUCTS. *(Dut.)* an Zwieten, P. A. (Biopharm. Dept., Univ. Amsterdam, etherlands). *Ned. Tijdschr. Geneeskd.* 17(7):267-274, 1973.

548 POLYPOID LESIONS OF THE GALLBLADDER: PRESENTATION OF TWO CLINICAL CASES. *(It.)* arrilli, L.; Abate, S.; Tafuri, R. (Inst. Surg. nat., Univ. Naples, Italy). *Policlinico Chir.* 9(6):297-307, 1972.

549 EXPERIENCE WITH A NEW PREPARATION IN THE TREATMENT OF BILIARY DYSKINESIAS. *(Sp.)* roca Sanz, J. (no affil.). *Rev. Esp. Enferm. Apar. ig.* 41(2):209-224, 1973.

550 EFFECT OF CHOLELITHIASIS ON THE PANCREAS. *(Sp.)* Artigas, V. (Santa Cruz San Pablo osp., Barcelona, Spain). *Rev. Esp. Enferm. Apar. ig.* 41(4):451-466, 1973.

1551 PEDICULATE CARCINOMAS OF THE COMMON BILE DUCT. *(Fr.)* Poilleux, J.; Vivier, J. (St. Antoine Hosp., Paris, France). *Rev. Fr. Gastroenterol.* (85):5-14, 1973.

1552 EXTRAHEPATIC TUMORS OF THE COMMON BILE DUCT: SURGICAL TREATMENT. *(Fr.)* Calame, A. (Fac. Med., Geneva, Switzerland). *Rev. Fr. Gastroenterol.* (86):37-46, 1973.

1553 PRIMARY SCLEROSING CHOLANGITIS. *(Fr.)* Paris, J.; Salembier, Y.; Dupont, A.; Paris, J. P.; Bleuez, M. (no affil.). *Rev. Fr. Gastroenterol.* (89):5-20, 1973.

See also, 1143, 1146, 1152, 1161, 1202, 1206, 1214, 1256, 1447.

GENERAL

554 VIRUS PARTICLES IN EPITHELIAL CELLS OF DUODENAL MUCOSA FROM CHILDREN WITH ACUTE ON-BACTERIAL GASTROENTERITIS. *(E.)* Bishop, R. F.; avidson, G. P.; Holmes, I. H.; Ruck, B. J. (Roy. hildren's Hosp., Melbourne, Australia). *Lancet* 7841):1281-1283, 1973.

lectron microscopy of duodenal mucosa from 9 children, aged 4 to 31 months, with acute nonbacterial gastroenteritis was used to reveal virus particles in pithelial cells. Duodenal biopsy was performed 7 to 120 hr after onset of symptoms of gastroenteritis. A repeat biopsy was performed 4 to 8 wk later n 3 of the children. Throat swab, duodenal contents, and stool specimen were subjected to routine ethods of culture for bacterial, fungal, and viral athogens. No bacterial or fungal pathogens were solated. The dissecting microscope revealed a atchy irregularity of the mucosal surface in most ases. Mucosal changes varying from mild to severe ere observed histologically in all 9 patients. The hanges included shortening and blunting of villi nd increased infiltration of the lamina propria ith mononuclear cells. Epithelial cells were more uboidal and less regular than usual. No vacuolation or cytoplasmic inclusion bodies were seen. In he electron microscope, viruslike particles were een in the epithelial cells of duodenal mucosa from of the 9 patients. Virus particles were recognized within distended cisternae of the endoplasmic eticulum in vacuolated cells. The morphological eatures of virus particles were identical in each f the 6 patients. Almost all particles had a ighly electron-dense core surrounded by a moderately ense capsid zone about 67 nm. in diameter. The 3 children who had a second biopsy after recovery revealed histologically normal duodenal mucosa.

1555 INTRACTABLE WATERY DIARRHOEA, HYPOKALAEMIA, AND ACHLORHYDRIA ASSOCIATED WITH NON-PANCREATIC RETROPERITONEAL NEUROGENOUS TUMOUR CONTAINING VASOACTIVE INTESTINAL PEPTIDE (V.I.P.). *(E.)* Fausa, O.; Fretheim, B.; Elgjo, K.; Semb, L. S.; Gjone, E. (Univ. Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 8(8):713-717, 1973.

A 60-year-old patient with a one-year history of intractable water diarrhea is described as having a typical 'WDHA-syndrome': watery diarrhea hypokalemia, and achlorhydria associated with non-beta-islet cell tumor of the pancreas. She was cured after removal of a non-pancreatic retroperitoneal tumor, histologically described as a complex ganglioneuroma. Preoperatively there was a high urinary excretion of catecholamines. The tumor contained a gastric secretory inhibitor demonstrated by bioassay, and by a specific radioimmunoassay high tumor content of vasoactive intestinal peptide (V.I.P.) was found. This observation strongly supports the concept of neural crest origin of the hormone-producing cells.

1556 NEONATAL NECROTIZING ENTEROCOLITIS. *(E.)* Master, S. P.; Truscott, D. E.; Templeton, A. C.; Middlemiss, J. H. (Mulago Hosp., Kampala, Uganda). *Br. J. Radiol.* 46(552):1063-1069, 1973.

Twenty-six cases of neonatal necrotizing enterocolitis occurring in a teaching hospital in East Africa are reported. The salient clinical features were vomiting, often bilious, abdominal distension, and constipation. The onset was most often in the first week of life but could occur up to three weeks after birth. Radiology provided the best means of diagnosis and the radiological signs commonly seen were dilated intestinal loops with fluid levels. Gas in the bowel wall produced a granular or foamy appearance, together with linear gas streaks or a concentric "ring" picture. Pneumoperitoneum and portal vein gas were seen in a few cases. Information regarding blood, stool and peritoneal cultures for organisms was available for 17 patients. In only 7 patients were the cultures positive. In 3 patients blood and stools both grew E. coli. In another 3 patients, the stools alone yielded mixed growth of E. coli and haemolytic streptococcus. In one case blood culture was positive for pseudomonas. Autopsy was performed on 15 cases. All were slightly dehydrated and jaundiced. The serosa of the gastro-intestinal tract were normal except in the areas of gangrene that had perforated. The mucosa were ulcerated over considerable distances. The most frequently ulcerated site was the terminal ileum. In the absence of perforation conservative management yielded the best results. Early diagnosis was essential for successful treatment.

1557 RESPONSE OF MAN TO INFECTION WITH VIBRIO CHOLERAE. I. CLINICAL, SEROLOGIC, AND BACTERIOLOGIC RESPONSES TO A KNOWN INOCULUM. *(E.)* Cash, R. A.; Music, S. I.; Libonati, J. P.; Snyder, M. J.; Wenzel, R. P.; Hornick, R. B. (Univ. Maryland Sch. Med., Baltimore). *J. Infect. Dis.* 129(1):45-52, 1974.

The spectrum of illness and the immunologic response produced by cholera in 111 volunteers from the Maryland House of Correction were studied. The strains of *Vibrio cholerae* used were classical Inaba 569 B and classical Ogawa 395. An oral dose of 10^8 organisms in buffered saline was required to induce the diarrhea of cholera. When given with live organisms, $NaHCO_3$ lowered the infecting dose from 10^8 to 10^4 organisms. Clinical manifestations of infection varied from culturally positive formed stools to "rice water" diarrhea. Severe diarrhea did not have an explosive onset but rather progressively increased in volume during a 24-hr period. In 45% of cases the stool was positive for *V. cholerae* before the onset of diarrhea. Titers of vibriocidal antibody rose after diarrhea, peaked the second week after challenge, and rapidly fell during the next four weeks.

1558 CORRELATION BETWEEN MORPHOLOGICAL ALTERATIONS AND ENZYME ACTIVITIES IN THE MUCOSA OF THE SMALL INTESTINE. *(E.)* Berg, N. O.; Dahlqvist, A.; Lindberg, T.; Norden, A. (Univ. Hosp., Lund, Sweden). *Scand. J. Gastroenterol.* 8(8):703-712, 1973.

Correlations between morphological alterations and enzyme activities were performed on 233 small intestinal biopsies taken from 178 adult patients with various gastrointestinal complaints. Parallel analyses were made of morphology (mucosal surface by dissection microscope inspection, mucosal index, distance from top of villi to bottom of crypts over depth of the crypts, and cellular changes), of intestinal dipeptidases and of intestinal disaccharidases. A statistical study of the correlation between these parameters showed: 1) All enzyme activities were significantly correlated to the morphological findings. The L-alanyl-L-proline dipeptidase activity was the one that was most strongly correlated to the morphology score, followed by lactase. 2) In severely pathological intestinal mucosa the disaccharidase activities were much more depressed than the dipeptidase activities. 3) Sucrase and isomaltase were strongly correlated to each other, as glycyl-L-leucine and glycyl-L-valine dipeptidase activities, and L-alanyl-L-proline and L-glutamyl-L-proline dipeptidase activities. There was a significant increase of the disaccharidase activities from the proximal part (duodenum) to the middle and distal parts of the gut. The increase for the dipeptidase activities was less obvious and only significant for peptidylproline dipeptidase activity.

1559 MICROBIAL CONTAMINATION OF THE GUT: ANOTHER FEATURE OF MALNUTRITION. *(E.)* Gracey, M.; Suharjono; Sunoto; Stone, D. E. (Princess Margaret Child. Med. Res. Fdn., Perth, Australia). *Am. J. Clin. Nutr.* 26(11):1170-1174, 1973.

The microbial flora of the stomach and upper small intestine was studied in 21 malnourished Indonesian children with diarrhea and compared with that found in 21 Australian children of Caucasian extraction with a variety of alimentary disorders. In the Indonesian children, there was marked microbial contamination of the upper gastrointestinal tract with a wide variety of microorganisms including: *enterobacteria, Streptococci,* fecal-type bacteria, *Corynebacteria, Salmonella paratyphi B, Shigella* sp., *Staphylococci, haemophilus influenza, escherichia coli,* and *klebsiella* sp. In several patients there was significant overgrowth by *Candida* sp., and in several others large numbers of anaerobic bacteria were isolated. It is suggested that these microbiological abnormalities are related to the pathogenesis of diarrhea in children with malnutrition.

1560 EPITHELIAL TUMORS OF THE SALIVARY GLANDS CONTAINING LYMPHATIC TISSUE. II. MIKULIEZ'S DISEASE. *(Pol.)* Sikorowa, L. (Inst. Onkol., Warsaw, Poland). *Patol. Pol.* 24(1):27-45, 1973.

1561 EPITHELIAL TUMORS OF THE SALIVARY GLANDS CONTAINING LYMPHATIC TISSUE. III. REMARKS ON THE PATHOGENESIS OF LYMPHOEPITHELIAL TUMORS OF THE SALIVARY GLANDS. *(Rus.)* Sikorowa, L. (Inst. Onkol. Warsaw, Poland). *Patol. Pol.* 24(1):45-56, 1973.

1562 INFANTILE ENTERITIS IN DUBLIN CAUSED BY ESCHERICHIA COLI 0142. *(E.)* Hone, R.; Fitzpatrick, S.; Keane, C.; Gross, R. J.; Rowe, B.

(Fed. Dublin Voluntary Hosp., Ireland). *J. Med. icrobiol.* 6(4):505-510, 1973.

563 ENTERIC INFECTION WITH ESCHERICHIA COLI 0127 IN THE MOUSE. II. FAILURE OF SPE- IFIC IMMUNITY TO ALTER INTESTINAL COLONIZATION OF NFANTS AND ADULTS. *(E.)* Kenny, J. F.; Weinert, . W.; Gray, J. A. (Univ. Pittsburgh Sch. Med., Pa.). . *Infect. Dis.* 129(1):10-20, 1974.

564 SEVERE ENTEROCOLITIS COMPLICATING CHRYSOTHERAPY. *(E.)* Kaplinsky, N.; Pras, M.; rankl, O. (Sheba Med. Ctr., Israel). *Ann. Rheum. is.* 32(6):574-577, 1973.

565 PROLONGED DIARRHOEA IN A CHILD WITH SEVERE COMBINED IMMUNODEFICIENCY. *(E.)* Henriken, K.; Juhl, F.; Koch, C. (Univ. Clin. Infect. is., Copenhagen, Denmark). *Acta Paediatr. Scand.* 2(6):670-674, 1973.

566 EXPERIMENTAL PROTEIN-ENERGY MALNUTRITION IN BABY BABOONS. 2. LIVER PATHOLOGY. *(E.)* atrick, R. S.; Mackay, A. M.; Coward, D. G.; Whiteead, R. G. (Royal Infirm., Glasgow, Scotland). *Br. . Nutr.* 30(2):171-179, 1973.

567 INVESTIGATIONS INTO THE ACTION OF XYLITOL ON THE STOOL FLORA. *(Ger.)* Dubach, U. .; Lejeune, R.; Forgo, I.; Buckert, A. (Kanton osp., Basel, Switzerland). *Dtsch. Med. Wochenschr.* 3(42):1960-1964, 1973.

568 EPIDEMIOLOGY OF INTESTINAL TRACT INFECTIONS OF BACTERIAL ORIGIN. *(Czech.)* Jezek, Z.; skova, D.; Hyncica, V. (Inst. Hyg. Epidemiol., rague, Czechoslovakia). *Cesk. Epidemiol.* 2(4):207-222, 1973.

569 EPIDEMIOLOGY OF VERSINIA ENTEROCOLITIS. *(Czech.)* Aldova, E.; Laznickova, K.; lchova, S.; Franova, O.; Janouskova, I.; Gaislerova, . (Inst. Hyg. Epidemiol., Prague, Czechoslovakia). *sk. Epidemiol.* 22(5):264-273, 1973.

70 MULTIPLE PRIMARY CARCINOMAS OF THE GASTROINTESTINAL TRACT. *(Ger.)* Rosch, W. (Med. lin., Univ. Erlangen-Nurnberg, Erlangen, Germany). *sch. Med. Wochenschr.* 98(40):1872-1873, 1973.

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See also, 1148, 1150, 1157, 1168, 1173, 1175, 1184, 1201, 1210, 1226, 1405.

GENERAL

Parasitology

1588 THE EPIDEMIOLOGY OF ANCYLOSTOMIASIS ON SAN MATEO ISLAND, CORRIENTES, ARGENTINA. *(Sp.)* Borda, C. E. (San Juan Bautista Hosp., Santo Tome, Argentina). *Bol. Chil. Parasitol.* 28(1/2):19-23, 1973.

Stool examinations were performed on 86 of the 154 inhabitants of San Mateo Island, a humid subtropical island in the Rio Uruguay on the border between Argentina and Brazil. The subjects examined consisted of 45 females and 41 males, 64% of whom were less than 21 yr old. The eggs of *Necator americanus* were found in the stools of 81 (94.2%) of those examined; 90.2% of the males and 97.89% of the females were infested. The pH of the soil around the school and ranchos averaged 6.2 (4.9 to 7.5), which favors development of the free-living larval stage of this parasite. The population lives in mud huts with earthen floors which they share with domestic animals. Water is obtained directly from the river, and there are no sanitary facilities. Foci of infection were found near the houses, in shady places, and in fenced-in areas of vegetation which were natural latrines. The inhabitants of this island generally go bare-footed.

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597 ACUTE INTESTINAL MANIFESTATIONS OF
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598 ONE CASE OF HUMAN DISTOMIASIS CAUSED BY
FASCIOLA GIGANTICA. SIMULTANEOUS HEPATIC
ND SUBCUTANEOUS INFESTATION. *(Fr.)* Fain, A.;
elville, J.; Jacquerye, L. (no affil.). *Bull.*
oc. Pathol. Exot. 66(3):400-406, 1973.

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TRICHOMONADS. ULTRASTRUCTURE OF CYSTS OF
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ANFGUISUGAE ALEXEIEFF 1911, AND MONOCERCOMONAS
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1600 CULTIVATION OF TOXOPLASMA GONDII NICOLLE AND MANCEAUX 1908 (PROTOZOA, EIMERIIDAE) IN SUBCULTURES OF HUMAN LIVER CELLS. *(Fr.)* Doby, J. M.; Durandiere, E. (no affil.). *C. R. Soc. Biol.* 167(5):765-766, 1973.

1601 NEW ASPECTS OF PARASITIC DISEASES OF THE LIVER. COMPLICATIONS OF SURGICAL TREATMENT. *(Fr.)* Bourgeon, R. (St. Roch Hosp., Nice, France). *Bull. Acad. Natl. Med.* 157(3):255-258, 1973.

See also, 0877, 1164, 1204.

GENERAL

Regional Enteritis

602 TRYPTOPHAN CONCENTRATION IN SERUM OF
PATIENTS WITH REGIONAL ENTERITIS. ITS
OSSIBLE RELATION TO DEPRESSION. PRELIMINARY RE-
ORT. *(E.)* Johansson, C.; Allgen, L. G.; Hell-
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ryptophan concentration was studied in the serum
f 20 patients with regional enteritis. Very low
-tryptophan values were found in 3 patients who
ad recurrent disease with intestinal stenosis and
teatorrhea after ileal resections. Subnormal
alues were found in 2 patients with intestinal
tenosis and increased fecal fat excretion, and in
others without stenosis. Of 12 patients with
ormal S-tryptophan values, 4 had ileostomies, 3
f whom after extensive ilial resections. A con-
iderable fecal fat excretion was found in 2 of
hese patients. No patient with normal values of
-tryptophan had intestinal stenosis. Depression
as diagnosed in 4 cases. Three patients re-
orted improvement of depression and increased
orking ability during treatment for long periods
ith 0.6 to 1.2 g L-tryptophan/day. Withdrawal
f the medication resulted in a return of the
epressive symptoms. These results indicate that
lowered or sometimes very low serum level of S-
ryptophan in regional enteritis can be expected
patients with intestinal stenosis and steatorrhea.

1603 HISTOCOMPATIBILITY ANTIGENS IN PATIENTS WITH INFLAMMATORY-BOWEL DISEASE. *(E.)* Asquith, P.; Mackintosh, P.; Stokes, P. L.; Holmes, G. K. T.; Cooke, W. T. (Dept. Exp. Pathol., Univ. Birmingham, England). *Lancet* (7848):113-115, 1974.

The histocompatibility antigen phenotypes of 48 patients with ulcerative colitis and 56 patients with Crohn's disease were studied. In ulcerative colitis there was a significantly increased frequency of histocompatibility antigen 11 and 7 and a reduced frequency of antigen 3. In Crohn's disease the frequency of antigen 9 was significantly reduced. The differences in frequency of histocompatibility antigens found in ulcerative colitis and Crohn's disease suggest involvement of genetic factors in inflammatory-bowel disease and could be related to the patient's immunological reactivity. Certain histocompatibility phenotypes have been associated with specific diseases (celiac disease 1 and 8; Reiter's disease and acute anterior uveitis W27). In many of these conditions there is an increased family frequency, suggesting the involvement of genetic factors. The finding of altered frequency of certain histocompatibility antigens suggests that genetic factors were operating. An immunological hypothesis may explain the pathogenesis of inflammatory-bowel disease. Histocompatibility antigens may cross-react with viral or bacterial antigens, leading to immunological tolerance and hence undue susceptibility to the infectious agent.

1604 THROMBOCYTOSIS AND MYELEMIA IN CROHN'S DISEASE. (TWO CASES). *(Fr.)* Klepping, C.; Martin, F.; Duzer, A.; Villand, J. (no affil.). *Rev. Fr. Gastroenterol.* (87):35-52, 1973.

1605 CROHN'S DISEASE OF THE COLON IN PULMONARY TUBERCULOSIS. *(Fr.)* Dubois, F.; Martin, E.; Toulet, J.; Tric, P.; Mombet, J.; Rousselet, J.; Zahler, M. (Internatl. Hosp., Univ. Paris, France). *Sem. Hop. Paris* 49(52):3539-3548, 1973.

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See also, 1155, 1160.

NUMBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

AKHUS, T.
1151*
ATE, S.
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DULLA, M.
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OUNA, G.M.
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RAHAMSSON, H.
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NUMBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

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AND
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NATIONAL INSTITUTE OF ARTHRITIS, METABOLISM, AND DIGESTIVE DISEASES

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized complilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

GASTROENTEROLOGY ABSTRACTS and CITATIONS is published monthly and includes citations and abstracts from the biomedical world literature as they are currently received. In addition, yearly cumulated subject and author indexes are published.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *World Medical Periodicals*, 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans
Ar.	Arabic
Bul.	Bulgarian
Ch.	Chinese
Cz.	Czech
Dan.	Danish
Dut.	Dutch
E.	English
Eston.	Estonian
Fin.	Finnish
Fl.	Flemish
Fr.	French
Ger.	German
Gr.	Greek
Heb.	Hebrew
Hun.	Hungarian
Ic.	Icelandic
In.	Indonesian
It.	Italian
Jap.	Japanese
Kor.	Korean
Latv.	Latvian
Lith.	Lithuanian
Nor.	Norwegian
Pol.	Polish
Por.	Portuguese
Rum.	Rumanian
Rus.	Russian
Ser.	Serbo-Croatian
Sl.	Slovak
Sp.	Spanish
Sw.	Swedish
Th.	Thai
Turk.	Turkish
Uk.	Ukrainian
Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
ATP	adenosine triphosphate
BSP	sulfobromophthalein
C	degrees centigrade
cm	centimeter(s)
CNS	central nervous system
cpm	counts per minute
DNA	deoxyribonucleic acid
e.g.	for example
g	gram(s)
μg	microgram(s)
hr	hour(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kg	kilogram(s)
LD_{50}	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar
mEq	milliequivalent(s)
mM	millimolar
μM	micromolar
mC,μC	milli-,microcurie(s)
mg	milligram(s)
min	minute(s)
ml	milliliter(s)
mm	millimeter(s)
MTD	maximum tolerated dose
ng	nanogram (10^{-9})
pg	picogram (10^{-12})
p.o.	orally
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
Rev.	review (only in citations)
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

NOTE

ue to circumstances beyond our control, *Gastroenterology Abstracts nd Citations*, Volume 7, Number 4, April 1973 inadvertently was mailed o another mailing list. We have arranged for additional copies to be rinted and mailed to the *Gastroenterology Abstracts and Citations* mailing ist. This should occur in the very near future.

e regret this inconvenience to our readers, and this office will ontinue surveillance to make sure that this issue will be mailed out orrectly as soon as possible.

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

508 SELECTIVE MIGRATION OF LYMPHOCYTES WITHIN THE MOUSE SMALL INTESTINE. *(E.)* Parrott, . M. V.; Ferguson, A. (Western Infirm., Glasgow, cotland). *Immunology* 26(3):571-588, 1974.

actors which determine the migration of lymphoid ells to lamina propria or Peyer's patches of mouse mall intestine were investigated by autoradiographic racing of i.v. injected spleen, thymus, and lymph ode cells. The number of labeled cells found in ntigen-free grafts of fetal small intestine were ompared with numbers found in normally sited gut f syngeneic CBA and C3H/Bi mice. Thymus, normal pleen, and B spleen lymphocytes, labeled with (^{3}H)-denosine or (5-^{3}H)-uridine, were confined to Peyer's atches and closely associated villi in both normal nd grafted gut. (^{3}H)-Thymidine-labeled lymphoblasts rom the mesenteric nodes of young (19-22 days) inected with *Nippostrongylus brasiliensis* were found n the lamina propria of graft and normal small inestine, but (^{3}H)-thymidine-labeled lymphoblasts rom oxazolone-primed lymph nodes did not migrate o villi. These results indicate that cells from he right source will migrate to gut tissue in the bsence of intraluminal antigenic stimulus. Changes n receptors during differentiation may explain the ack of interest shown by lymphoblasts for nodular reas of the lymphoid tissue, but do not explain the rocess by which some cells extravasate into the amina propria and others do not. If a specific proess is involved it probably applies to both T and lymphoblasts.

609 GERMINAL CENTRES AND THE ORIGIN OF THE B-CELL SYSTEM. *(E.)* Nieuwenhuis, P.; van ouhuijs, C. E.; Eggens, J. H.; Keuning, F. K. Dept. Histol., Univ. Groningen, Netherlands). *Imunology* 26(3):497-507, 1974.

oung adult Gold-Agouti rabbits were subjected to 50 rads whole-body x-irradiation 1 week after ppendectomy or with the appendix shielded during rradiation. In control animals regeneration of ollicular structures in the spleen was observed 7 ays after irradiation; between the 7th and 14th day he number of cells/regenerating follicle and the umber of follicles increased rapidly. Follicular egeneration in appendectomized and irradiated anials was delayed for 3-4 days compared with controls, hile regeneration in the appendix-shielded and iradiated group was evident as early as 4 days postrradiation. Histologic examination showed complete bsence of germinal centers in appendixes of appenicostomized and irradiated animals. Local (^{3}H)-hymidine labeling of the appendix indicated subtantial cell traffic from the appendix to spleen ollicular structures, in particular to the lymphoyte corona and marginal zone, though not to germinal enters. Following challenge with paratyphoid vacine on the 10th day after irradiation, appendectoized animals had a substantially lower antibody esponse than did animals which had only been iradiated. Results for splenectomy 1 hr after antigenic challenge showed the spleen is essential to antibody formation. It is concluded that following 450 rads whole-body irradiation the appendix contributes to the recovery of antibody-forming capacity of the spleen by production of antibody-forming cell precursors; these latter cells are presumably identical with the folice-replenishing lymphocytes derived from appendix germinal centers.

1610 HISTOLOGICAL, HISTOCHEMICAL AND PHARMACOLOGICAL OBSERVATIONS ON MAST CELLS IN THE STOMACH OF THE RAT. *(E.)* Heap, B. J.; Kiernan, J. A. (Hlth. Sci. Ctr., Univ. Western Ontario, London, Canada). *J. Anat.* 115(3):315-325, 1973.

Gastric mast cells were examined in three strains of rat (albino Wistar, hooded Wistar, and Sprague-Dawley) by a variety of histochemical techniques. Mast cells with cytoplasmic granules containing sulfated mucosubstance were abundant in the extraglandular spaces of the superficial 2/3 of the gastric mucosa. These mucosal mast cells differed from the typical mast cells of the submucosal, muscular, and serosal layers in that (a) they were generally smaller; (b) they did not contain stainable hexoses in the α-D-arabinopyranoside configuration; (c) their granules did not owe any significant part of their acidity to carbohydrate-bound carboxyl groups; (d) histamine, detectable by the o-phthalaldehyde technique, was removed from mucosal, but not from typical mast cells by fixation in Carnoy and paraffin embedding. The mucosal mast cells were slightly more resistant than the typical ones to degranulation by compound 48/80 (*p*-methoxy-*N*-methylphenethylamine), administered for 5 days, and were completely degranulated by 5 days of treatment with dexamethasone. The latter drug had no effect on typical mast cells. The function of the gastric mucosal mast cells remains a mystery, but they may be involved in producing local vasodilatation and increased capillary permeability during periods of increased secretory activity.

1611 CHANGES IN PANCREATIC MORPHOLOGY ASSOCIATED WITH AGING. *(E.)* Kreel, L.; Sandin, B. (Northwick Park Hosp., Harrow, England). *Gut* 14(12):962-970, 1973.

Retrograde pancreatography has been carried out at necropsy in 120 cases and the results have been analysed in statistical detail. With increasing age, changes in pancreatic anatomy occur which must not be taken to indicate pathology. These changes are: (1) low or ptotic position of the pancreas so that the papilla of Vater is below the level of L3; (2) calcification of the splenic and superior mesenteric arteries which produce calcific densities around the pancreas; (3) increasing width of main pancreatic duct along its whole length at about 8% per decade; in the elderly, widths of 1 cm can occur in the main duct in the head of the pancreas without evidence of obstruction: (4) formation of ductular ectasia which affects mainly the interlobular ductules but also intralobular ductules; (5) some ectatic ducts reach the dimensions of cysts, ie, 1-2 cm in diameter. Other morphological changes which have been demonstrated and which may produce difficulties in radiological interpretation are: (a) narrowed ducts not due to stricture; (b) space-occupying lesions due to superior mesenteric artery, splenic artery, aorta, vertebral osteophytes, sympathetic ganglion, and lymph nodes; (c) metastases in the pancreas-these must be distinguished from primary pancreatic carcinoma. It is clear that the pancreas moves pari passu with the duodenal loop. This fact must be taken into account in isotope scanning of the pancreas in the elderly. The head of the pancreas may be entirely to the left of the spine in some cases. There is a steady increase in duct calibre with age throughout the whole of the pancreas. The normal dilated duct in the elderly retains its uniform tapering appearance with smooth margins, this is not so in obstruction or chronic pancreatitis. It is concluded that this study shows that definite changes occur in the pancreas with increasing age. These changes must be taken into account in assessing duct pancreaticograms if false interpretations are to be avoided.

1612 FINE STRUCTURE OF CYTOPLASMIC PARACRYSTALLINE IN HUMAN HEPATIC PARENCHYMAL CELLS. *(E.)* Ishihara, T.; Uchino, F.; Furutani, H.; Matsumoto, N. (Yamaguchi Univ. Sch. Med., Ube, Japan). *Acta Pathol. Jap.* 23(4):705-715, 1974.

Cytoplasmic paracrystalline structures were observed in hepatic parenchymal cells from a chronic alcoholic with hereditary sperocytosis and from a nonalcoholic with metastatic relapse of gastric cancer. The inclusions consisted of parallel filaments, 8-10 mμ thick and 15 nm apart, crossing each other at an approximate angle of 60° and forming a lattice-like structure. Such nonmembrane bound paracrystalline was located near the nucleus and corresponded to masses positively stained with the periodic acid-Schiff reaction. Most of the cytoplasmic paracrystalline was surrounded by a zone of cytoplasm containing increased granular endoplasmic reticulum and free ribosomes. The Golgi complex was also well developed. These organellar changes suggest that the cytoplasmic paracrystalline is a product of *de novo* synthes or storage, rather than a degeneration product of pre-existing organelles.

1613 ELECTRON MICROSCOPY OF ISOLATED RAT HEPATOCYTES BEFORE AND AFTER TREATMENT WITH PHALLOIDINE. *(Eng.)* Weiss, E.; Sterz, I.; Frimmer, M.; Kroker, R. (Vet. Pathol. Inst., Justus Liebig Univ., Giessen, Germany). *Beitr. Pathol.* 150(4): 345-356, 1973.

Isolated rat hepatocytes were studied before and after incubation with phalloidine (25 and 100 μg/ml cell suspension). Normal isolated hepatocytes were well preserved but had microvilli all over the cell surface and numerous autophagic vacuoles in various developmental stages. Vacuolization of hepatocytes, as seen in livers poisoned *in vivo* or *in situ*, did not occur in poisoned isolated cells. The inability of phalloidine to produce additional vacuoles in isolated hepatocytes gives further support to the theory that a hydrostatic pressure gradient is a prerequisite for vacuolization. After 10 min exposure to phalloidine most hepatocytes showed cytoplasmic bulges. It is suggested that these bulges result from structural changes of liver plasma membranes due to strong binding of the toxin. The structural changes then cause a "weakness" of the plasmalemma which yields to intracellular pressure, thus giving rise to the protusions and to the disintegration and death of the cells within 120 min of exposure.

1614 PROLIFERATION AND DIFFERENTIATION OF GASTROINTESTINAL CELLS. *(E.)* Lipkin, M. (Mem. Sloan-Kettering Cancer Ctr., New York, N.Y.). *Physiol. Rev.* 53(4):891-915, 1973.

1615 MAPPING OF THE SYMPATHETIC INNERVATION OF THE LEFT AND MEDIAN LOBES OF THE RAT LIVER. ELECTRON MICROSCOPIC STUDY. *(Fr.)* Blouin, A.; Cote, M. G. (Fac. Med., Univ. Montreal, Canada). *Rev. Can. Biol.* 32(3):187-211, 1973.

1616 STUDIES ON LIPIDS OF BRAIN, KIDNEYS, AND LIVER OF MICE DURING POSTNATAL DEVELOPMENT. *(E.)* Pushpendran, C. K.; Eapen, J. (Bhabha Atomic Res. Ctr., Bombay, India). *Biol. Neonate.* 23(3-4): 303-313, 1973.

1617 THE SYNTHESIS AND TURNOVER OF RAT LIVER PEROXISOMES. V. INTRACELLULAR PATHWAY OF CATALASE SYNTHESIS. *(E.)* Lazarow, P. B.; De Duve, C. (Rockefeller Univ., New York, N.Y.). *J. Cell Biol.* 59(2) Part 1:507-524, 1973.

1618 THE SYNTHESIS AND TURNOVER OF RAT LIVER PEROXISOMES. IV. BIOCHEMICAL PATHWAY OF CATALASE SYNTHESIS. *(E.)* Lazarow, P. B.; De Duve, C. (Rockefeller Univ., New York, N.Y.). *J. Cell Biol.* 59(2) Part 1:491-506, 1973.

1619 TWO EXAMPLES OF PHYSIOLOGICAL MATURATIONS IN RAT FETAL LIVER. *(E.)* Jacquot, R. L.; Plas, C.; Nagel, J. (Ctr. Biol. Developmental Biochem., Univ. Res. Ctr., Reims, France). *Enzyme* 15(1-6):296-303, 1973.

1620 THE REGULATION OF LIVER DEVELOPMENT BY BIRTH. *(E.)* Nemeth, A. M. (Med. Sch., Univ. Pennsylvania, Philadelphia). *Enzyme* 15(1-6): 286-295, 1973.

1621 CHANGES IN RAT LIVER MITOCHONDRIA AND ENDOPLASMIC RETICULUM DURING DEVELOPMENT AND DIFFERENTIATION. *(E.)* Pollak, J. K.; Duck-Chong, C. G. (Dept. Histol., Univ. Sydney, Australia) *Enzyme* 15(1-6):139-160, 1973.

522 MULTIHORMONAL REGULATION OF HEPATIC HISTIDASE DURING POSTNATAL DEVELOPMENT. E.) Feigelson, M. (Harlem Hosp. Ctr., New York, .Y.). *Enzyme* 15(1-6):169-197, 1973.

523 ULTRASTRUCTURE OF FETAL LIVER AT TERM AND DURING PROLONGED GESTATION IN THE RAT. E.) Thliveris, J. A. (Dept. Anat., Univ. Manitoba, innipeg, Canada). *Am. J. Obstet. Gynecol.* 118(6): 64-871, 1974.

624 AUTONOMIC INNERVATION OF THE TUNICA MUSCULARIS OF THE STOMACH AND INTESTINE. *(Rus.)* egosturova, Z. N. (no affil.). *Kazan. Med. Zh.* 5):74-75, 1973.

525 EMBRYONIC DEVELOPMENT OF BURSA OF FABRICIUS. *(Georg.)* Korkia, I. R. (Zool. Inst., revan, USSR). *Soobshch. Akad. Nauk Gruz. SSSR* 1(3):733-735, 1973.

526 STUDIES ON THE POLYMODAL DISTRIBUTION OF HEPATIC LYSOSOMES AND PEROXISOMES. *(E.)* illiams, Jr., J. N.; Throp, S. L. (Lab. Nutr. ndocrinol., NIH, Bethesda, Md.). *Proc. Soc. Exp. iol. Med.* 145(1):289-293, 1974.

527 METAPHASE CHROMOSOME ABERRATIONS IN THE CHINESE HAMSTER LIVER IN VIVO AFTER EITHER CUTE OR FRACTIONATED ^{60}Co IRRADIATION. *(E.)* cKay, L. R.; Shaw, S. M.; Brooks, A. L. (Dept. ionucleonics, Purdue Univ., West Lafayette, Ind.). *adiat. Res.* 57(1):187-194, 1974.

528 IDENTIFICATION OF VAGAL STRUCTURES AT THE ESOPHAGEAL HIATUS. *(E.)* Skandalakis, J. .; Rowe, Jr., J. S.; Gray, S. W.; Androulakis, . A. (Piedmont Hosp., Atlanta, Ga.). *Surgery* 5(2):233-237, 1974.

529 MORPHOLOGICAL AND FUNCTIONAL CHARACTERISTICS OF REGENERATING CHICKEN PANCREAS. *(Rus.)* zhivanian, K. A. (Dept. Zool., Erevan State Univ., SSR). *Biol. Zh. Armenii* 26(10):64-71, 1973.

530 REGENERATION OF LIVER IN RATS IN THE ABSENCE OF PORTAL SPLANCHNIC ORGANS AND A ORTAL BLOOD SUPPLY. *(E.)* Bucher, N. L. R.; waffield, M. N. (Huntington Mem. Hosp., Boston, ass.). *Cancer Res.* 33(12):3189-3194, 1973.

531 OXIDATIVE METABOLISM OF CARBON DISULPHIDE BY THE RAT. EFFECT OF TREATMENTS WHICH ODIFY THE LIVER TOXICITY OF CARBON DISULPHIDE. *(E.)* e Matteis, F.; Seawright, A. A. (Med. Res. Council, arshalton, Surrey, England). *Chem. Biol. Interact.* (6):375-388, 1973.

1632 CORRELATION OF CELL TRANSIT TIME WITH SURVIVAL TIME IN ACUTE INTESTINAL RADIATION DEATH OF GERM-FREE AND CONVENTIONAL RODENTS. *(E.)* Tsubouchi, S.; Matsuzawa, T. (Aichi Cancer Ctr. Res. Inst., Nagoya, Japan). *Int. J. Radiat. Biol.* 24(4): 389-396, 1973.

1633 OPTICAL DIFFRACTION ON TILTING SERIES OF PARACRYSTALLINE INTRANUCLEAR INCLUSIONS OF DOG LIVER PARENCHYMAL CELLS. *(E.)* Reimer, L.; Roessner, A.; Themann, H.; von Bassewitz, B. D. (Med. Dept., Univ. Munster, Germany). *J. Ultrastruct. Res.* 45(5/6):356-365, 1973.

1634 EFFECT OF COCARBOXYLASE ON THE REGENERATIVE ACTIVITY OF THE LIVER AFTER TOXIC LIVER INJURY. *(Rus.)* Shafiev, E. K. (no affil.). *Zdravookhr. Tadzhik.* (5):69-70, 1973.

1635 VASCULARIZED TRANSPLANTATION OF THE RAT PANCREAS WITHOUT DUODENUM. *(E.)* Nozawa, M.; Weil, III, R.; McIntosh, R.; Reemtsma, K. (Columbia Univ. Coll. Physicians, New York, N.Y.). *Transplantation* 17(1):137-140, 1974.

1636 MEMBRANE BEHAVIOUR OF INTEREPITHELIAL LYMPHOCYTES OF THE INTESTINE. ELECTRON-MICROSCOPE OBSERVATIONS ON RUTHENIUM RED-STAINED TISSUES. *(Ger.)* Gebbers, J. O.; Otto, H. F. (Pathol. Inst., Univ. Hamburg, Germany). *Virchows Arch.* [*Pathol. Anat.*] 361(2):175-184, 1973.

1637 DELAYED, IN VIVO HEPATIC POSTMORTEM AUTOLYSIS. II. MORPHOLOGICAL CHANGES IN RETICULO-ENDOTHELIAL CELLS. *(E.)* Nunley, W. C.; Dickie, M. W.; Schuit, K. E. (Sch. Med., Univ. Virginia, Charlottesville). *Virchows Arch.* [*Zellpathol.*] 14(4):285-291, 1973.

1638 STRESS INDUCED INHIBITION OF JEJUNAL CRYPT CELL PROLIFERATION. *(E.)* Tutton, P. J. M.; Helme, R. D. (Dept. Anat., Monash Univ., Clayton, Australia). *Virchows Arch.* [*Zellpathol.*] 15(1):23-34, 1973.

1639 A QUANTITATIVE MORPHOLOGIC ANALYSIS OF THE RAT'S LIVER IN THE POSTNATAL PERIOD. *(E.)* Pak, S. Y. (Yonsei Univ. Coll. Med., Seoul, Korea). *Yonsei Med. J.* 13:60-66, 1972.

1640 CELL POPULATION OF THE MUCOSAL CHORION IN THE RECTAL BIOPSIES FROM SUBJECTS IN NORTHEASTERN BRAZIL: COMPARISON BETWEEN ENDOSCOPIC AND HISTOPATHOLOGICAL FINDINGS. *(Por.)* Ferreira, F. V. de A.; Leao, P. H. S. (Fac. Med., Federal Univ. Ceara, Fortaleza, Brazil). *Arq. Gastroenterol.* 10(2):121-130, 1973.

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

1641 ELECTRON MICROSCOPE STUDY OF INTERMURAL VESSELS IN ALLOTRANSPLANTATION OF THE SMALL INTESTINE. *(Rus.)* Lysenko, A. I.; Dirpatovskii, I. D.; Bukov, V. A.; Mosin, N. I. (I. M. Sechenov. 1st Moscow Med. Inst., USSR). *Vestn. Akad. Med. Nauk SSSR* (9):81-84, 1973.

1642 STRUCTURAL AND BIOCHEMICAL ASPECTS OF THE EFFECTS OF SOME MEDIA USED FOR ISOLATION AND FRACTIONATION OF MOUSE LIVER NUCLEI. *(Fr.)* Chevaillier, P.; Philippe, M. (Lab. Biol. Cell., Univ. Paris, Creteil, France). *Exp. Cell Res.* 82(1):1-14, 1973.

1643 RAPID ELECTRON MICROSCOPE METHODS FOR THE STUDY OF HEPATOCYTES. *(Fr.)* Leung, T. K. (Dept. Pathol. Anat., Claude Bernard Univ., Lyon, France). *Ann. Anat. Pathol. (Paris)* 18(4):477-482, 1973.

1644 HISTOCHEMICAL CHARACTERISTICS OF THE EPITHELIAL LINING OF THE ESOPHAGUS IN MAN AND CERTAIN MAMMALS. *(E.)* Mogil'naia, G. M. (Kubaru Med. Inst., Krasnodar, USSR). *Arkh. Anat. Gistol. Embriol.* 65(9):68-75, 1973.

1645 THE EFFECT OF MALATHION ON CERTAIN REACTIONS OF RESPIRATORY ENZYMES AND ULTRASTRUCTURE OF MITOCHONDRIA IN RAT LIVER. *(Pol.)* Beskid, M.; Klos, H.; Suwala, Z.; Szczyszkowska, A.; Wojcik, J. (Provincial Inst. Hyg., Warsaw, Poland). *Rocz. Panstw. Zakl. Hig.* 24(6):741-748, 1973.

See also, 1834, 1842, 1911, 1915, 1948, 2083, 2476.

ABSORPTION-EXCRETION-TRANSPORT

1646 EFFECT OF LUMINAL SODIUM CONCENTRATION ON BICARBONATE ABSORPTION IN RAT JEJUNUM. *(E.)* Hubel, K. A. (Univ. of Iowa, Iowa City). *J. Clinical Investigation* 52(12):3172-3179, 1973.

The influence of luminal sodium concentration (Na^+) on net bicarbonate (HCO_3-) absorption was studied by perfusing male Holtzman rat jejunum *in vivo*. When Na^+ was omitted from the perfusion fluid, HCO_3- absorption diminished by a fixed amount over a range of initial HCO_3- concentrations of 15 to 80 mM. This change was not caused by alterations in transmural electrical potential difference (PD) or direction of water movement. Because the rate of HCO_3- absorption decreased as the luminal HCO_3- concentration lessened, Na^+-dependent HCO_3- absorption accounted for an increasing percent of total absorption as the luminal concentration of HCO_3- diminished. The effect of Na^+ on HCO_3- absorption is mediated, at least in part, by H^+ secretion, because luminal CO_2 production (manifested by luminal P_{CO2}) dimished as HCO_3- absorption decreased. The changes in P_{CO}^2 are caused by reaction of H^+ with HCO_3- in the luminal fluid because luminal P_{CO2} is augmented by the presence of HCO_3- and is diminished by addition of phosphate or Tris buffer.

1647 DIBASIC AMINO ACID ABSORPTION IN MAN. *(E.)* Hellier, M. D.; Chir, B.; Holdsworth, C. D.; Perrett, D. (St. Leonard's Hospital, London, England). *Gastroenterology* 65(4):613-618, 1973.

Dibasic amino acid absorption in the human jejunum was studied through the use of a modified double lumen perfusion method. Kinetic constants (K_t and V_{max}) for lysine were: K_t 4.9 mM; V_{max} 51.3 µmoles min^{-1} 30 cm^{-1}; and for arginine were: K_t 3.8 mM, V_{max} 46.3 µmoles min^{-1} 30 cm^{-1}. Lysine absorption was compared in 4 normal and 4 cystinuric subjects. A significant difference was seen between these groups when studied by perfusion but not by using the oral load method. Furthermore, oral load studies using mixtures of lysine, ornithine, and arginine showed a difference between the groups for arginine but no difference for lysine and ornithine. All three dibasic amino acids appeared to be well absorbed in the cystinuric patients.

1648 STUDIES OF ANTI-INFLAMMATORY DRUGS AND ALIPHATIC ALCOHOLS ON ANTRAL MUCOSA. *(E.)* Cooke, A. R.; Kienzle, M. G. (Univ. of Iowa, Iowa City). *Gastroenterology* 66(1):56-62, 1974.

Studies were made in 4 dogs with antral pouches of transmucosal potential difference (PD), and Na^+, H^+, K^+, and Cl^- fluxes, in response to aspirin, phenylbutazone, indomethacin, and cortisone acetate, as well as the aliphatic alcohols of carbon chain lengths C_1 to C_4. Potential difference was measured using 3% agar-saturated KCl electrodes connected to a potentiometer. Net fluxes of electrolytes were measured after instillation of 15 to 20 ml of a solution of 100 mM HCl + 54 mM NaCl, plus the test substance. Aspirin, 10 mM and 20 mM, increased net gain of Na^+ into the pouch and increased net loss of H^+ from the pouch. The potential difference decreased from control of -43.8 mv to -31.2 mv in response to 20 mM aspirin. Phenylbutazone (200 mg per 100 ml), indomethacin (250 mg per 100 ml), and cortisone acetate (2.5 mg per 100 ml) did not change net movements of electrolytes or alter potential difference. The net movements of Na^+ and H^+ increased and potential difference decreased with the aliphatic alcohols (C_1 to C_4), and this effect was proportional to the molar concentration of the alcohol and to the carbon chain length; the greater the concentration or number of carbon atoms, the greater the effect. Branched chain alcohols (isopropanol nd *t*-butyl alcohol) had less effect on potential ifference and Na^+-H^+ movements than their straight hain counterparts. Hypertonic solutions of glucose aused a fall in potential difference and an increase n net Na^+-H^+ movements. Potential difference was ore sensitive of gastric mucosal damage than mea- urements of ion movement. These studies indicate hat the electrolyte and potential difference response f antral mucosa to alcohols and to anti-inflammatory rugs is generally similar to that found for fundic ucosa.

549 IRON IN THE DUODENAL MUCOSA OF NORMAL, IRON-LOADED, AND IRON-DEFICIENT RATS. *(E.)* attii, R.; Mielke, C. H., Jr.; Levine, P. Y.; rosby, W. H. (Boston City Hosp., Mass.). *Blood* 2(6):959-966, 1973.

ron absorption studies with oral $^{59}FeSO_4$ were per- ormed on 13 iron-depleted, 11 iron-loaded, and 10 ontrol male albino Sprague-Dawley rats, and nonheme ron was determined in both isolated epithelial ells and defoliated mucosa obtained from the duo- enum. Mean absorption by the control animals was 8.5% of the dose. Both iron-depleted and iron- oaded groups showed significant differences in iron osorption (54.5% and 2.2% respectively). Compared ith the normal controls, iron was decreased in the pithelial cells of the iron-deficient group, where- s higher concentrations were observed in the de- oliated mucosa of iron-loaded animals. The latter oservation was confirmed by the presence of iron- aden macrophages seen in sections of the lamina ropria of the iron-loaded rats.

550 INHIBITORY EFFECT OF KONJAC MANNAN ON BILE ACID TRANSPORT IN THE EVERTED SACS FROM AT ILEUM. *(E.)* Kiriyama, S.; Enishi, A.; Yura, . (Tokushima Univ., Japan). *J. Nutr.* 104(1):69-78, 974.

everal experiments were conducted to study the pos- ible mechanisms of the hypocholesterolemic effect f konjac mannan (KM) and to examine whether puri- ied, water-soluble, undenatured KM binds bile acids n an aqueous solution. Crude konjac mannan gran- les have a strong hypocholesterolemic activity in ats fed a hypercholesterolemic diet. The crude ranules are prepared from tubers of the Amorpho- hallus plant by removing starch and are composed ainly of konjac mannan which yields glucose and mannose lone on complete hydrolysis. The active principle n the crude granules was identified to be konjac annan itself. The rate of cholic acid or tauro- holate dialysis across a cellophane membrane was ot modified at all even when pure KM or pectin was dded at 0.25% (w/v) level to the cholic acid or odium taurocholate containing side (each concentra- ion, 0.1 mg/ml). Therefore, we concluded that KM r pectin binds neither of these acids in water, and onsequently, in the intestinal lumen. On the other and, it was shown using carboxyl-^{14}C-cholic acid nd sodium 24-^{14}C-taurocholate that bile acid trans- ort in the everted sacs prepared from the rat ileum, here the active transport capacity for bile acids localizes, was significantly lowered to 30 to 50% of the control values by the addition of KM (0.25%) to the mucosal medium. Citrus pectin did not show any inhibitory action at either level of 0.25 or 0.5%. The effective minimum concentration of KM seemed to be about 10^{-6} M. In the everted sacs from the proximal jejunum where the active transport machinery does not function, cholic acid transport activity was very low (about 10% or less of that in the ileum) and this diffusion process was not modified by the addition of KM.

1651 EFFECTS OF ETHANOL ON THE TRANSPORT OF MANGANESE BY SMALL INTESTINE OF THE RAT. *(E.)* Schafer, D. F.; Stephenson, D. V.; Barak, A. J.; Sorrell, M. F. (Univ. of Nebraska Med. Ctr., Omaha). *J. Nutr.* 104(1):101-104, 1974.

The transmural movement of manganese was measured in isolated loops of Sprague-Dawley rat jejunum and compared to that obtained when the perfusate on the mucosal side of the tissue contained 3% ethanol. In *in vivo* studies, fasted Sprague-Dawley rats were gavaged with 0.01 μCi ^{54}Mn in the presence of either water or ethanol solution (4 g/kg body weight). After 3 hours the livers were excised and counted for radioactivity. In the *in vivo* experiments, ethanol stimulated the absorption of manganese two-fold as measured by the uptake of this metal in the liver. In the *in vitro* experiments, ethanol stimulated the transmural movement of manganese by a factor of four. Pyrazole, an alcohol dehydrogenase inhibitor, reduced ethanol-induced transport of Mn by 70% in the perfused jejunum indicating that the effects of ethanol are principally mediated by metabolism of ethanol in the gut.

1652 THE EFFECT OF ATP ON THE TRANSPORT OF HEXOSES AND AMINO ACIDS IN EVERTED SACS OF RAT SMALL INTESTINE. *(E.)* Hardcastle, P. T. (Dept. Physiol., Univ. Sheffield, England). *Biochim. Biophys. Acta* 332(1):114-121, 1974.

The effects of exogenous ATP (5 mM) on the transport of hexoses and amino acids in everted sacs of rat small intestine were studied. Mucosal ATP was inhibitory to net leucine, glycine, and galactose transport whether expressed as mucosal transfer or final tissue concentration. The inhibition of transfer was specific to the ATP molecule; ADP, AMP, adenosine, or adenine produced no effect. The inhibitory effect of ATP could be prevented if additional Ca^{2+} or Mg^{2+} was present in the incubation medium. The divalent cations themselves had no effect on transport. ATP stimulated the efflux of leucine and galactose from preloaded preparations. The stimulatory effect was specific to ATP and could be prevented by extra Mg^{2+} in the incubation medium. Although ATP apparently inhibits intestinal transport by an increase in membrane permeability, the way in which ATP brings about the permeability change is not fully understood. ATP could act directly on the membrane due to its ability to chelate divalent metal ions or it could affect enzyme systems necessary to maintain structural integrity.

1653 ELECTROLYTE TRANSPORT ACROSS ISOLATED LARGE INTESTINAL MUCOSA. *(E.)* Binder, H. J.; Rawlins, C. L. (Yale Univ., New Haven, Conn.). *Am. J. Physiol.* 225(5):1232-1239, 1973.

Transmural electrolyte fluxes were determined across male, Sprague Dawley rat colonic mucosa stripped of its serosal and part of its muscular layer to determine the mechanism of ion transport in the large intestine. When 10 mM glucose was present in both mucosal and serosal solutions, the transmural electrolyte fluxes increased but the short-circuit current was not changed when compared to a glucose-free HCO_3-Ringer solution. Selective removal of Cl, HCO_3 or Na in the presence of glucose significantly decreased the transmural electrolyte fluxes. The fluxes, but not the short-circuit current were inhibited by acetaxolamide. These results are best explained by the presence of two Na-transport systems: an "electrogenic" and a "neutral" or coupled Na-Cl transport. It is proposed that the coupled NaCl absorption may represent two related ion exchanges: Na-H and Cl-HCO_3.

1654 AN AUTORADIOGRAPHIC STUDY OF THE INTESTINAL ABSORPTION OF ^{22}Na. *(E.)* Jodal, M. (Univ. of Goteborg, Sweden). *Acta Physiol. Scand.* 90(1):79-85, 1974.

The distribution of ^{22}Na within the villous tissue of 9 cats was studied by means of an autoradiographic technique during absorption of different saline solutions containing the tracer, the resolving power being about 10 μm. After the first minute of absorption most of the grains were localized in the epithelial cells, the grain density in the lamina propria being low. The same distribution of ^{22}Na was seen after 5 min incubation during maximal vasodilatation and during absorption of a hypotonic saline solution. A constant intraluminal perfusion of isotonic saline for 30 min changed the autoradiographic picture, the highest radioactivity concentration now being found in the lamina propria. The gradient of grain density along the villous length was, however, not as marked as that reported by Haljamae who proposed that this gradient was created by a countercurrent multiplication of sodium in the hairpin vascular loops in the villi. The results in this paper support the hypothesis that both sodium and water are crossdiffusing in such a system between the vessels constituting the countercurrent exchanger.

1655 EFFECTS OF OLEIC AND RICINOLEIC ACIDS ON NET JEJUNAL WATER AND ELECTROLYTE MOVEMENT: PERFUSION STUDIES IN MAN. *(E.)* Ammon, H. V.; Thomas, P. J.; Phillips, S. F. (VA Hosp., Wood, Wisconsin). *J. Clin. Invest.* 53(2):374-379, 1974.

To examine the effects of oleic acid and ricinoleic acid on jejunal absorption, steady-state jejunal perfusions were performed in 18 healthy volunteers, divided into 4 groups. Taurocholate, used to solubilize the fatty acids, did not influence absorption. Both fatty acids (concentration, 10 mM) reversed electrolyte and water net movement; that is, they induced fluid secretion; this effect was rapidly reversible. Ricinoleic acid (the active principle of castor oil) was the more potent, producing fluid secretion when perfused at concentrations at which oleic acid was without effect. However, ricinoleic acid was absorbed more slowly than was oleic acid, and hence was associated with higher intraluminal concentrations. Addition of lecithin and monoolein did not diminish the secretory effect of ricinoleic acid; addition of a secretory bile acid (taurodeoxycholate) did not enhance the effect. The response of the jejunal mucosa to a known cathartic provides observations pertinent to the pathophysiology of steatorrheal diseases in man. Dietary fatty acid also has secretory properties with respect to the human intestine; bacterial hydration, to hydroxy fatty acids, is not required to induce fluid secretion.

1656 EFFECT OF DIETARY CALCIUM AND AGE ON JEJUNAL CALCIUM ABSORPTION IN HUMANS STUDIED BY INTESTINAL PERFUSION. *(E.)* Ireland, P.; Fordtran, J. S. (Univ. of Texas Southwestern Med. Sch., Dallas). *J. Clinical Investigation* 52(11):2672-2681, 1973.

Jejunal calcium absorption was measured from test solutions containing 1.0, 2.5, 5, and 10 mM calcium (as calcium gluconate) in 2 groups of volunteer subjects: 7 adults, 22 to 31 yr old and 6 adults 61 to 75 yr old. Absorption rates increased progressively as luminal calcium concentration was increased, although there was a tendency toward saturation of the absorptive process at the higher concentrations. Calcium absorption was higher in normal young adults than in normal subjects over age 60. In both groups a 300 mg calcium diet for 4-8 wk enhanced calcium absorption relative to absorption rates after 4-8 wk on a 2,000 mg calcium diet. This adaptation was more definite and dramatic in the young than in the old subjects.

1657 THE EVERTED RAT INTESTINE USED AS A MODEL SYSTEM TO DEMONSTRATE REGULATION OF SODIUM ABSORPTION FOLLOWING HEMORRHAGE (37740). *(E.)* Martinson, I. M.; Ingraham, R. C. (Univ. of Minnesota, Minneapolis). *Proc. Soc. Exp. Biol. Med.* 145(1):21-24, 1974.

The everted intestine from male retired breeder rats (Holtzman strain) was used as a model system to demonstrate the regulation of sodium absorption following hemorrhage in dogs. Plasma obtained from dogs who had been hemorrhaged 20% of blood volume increased sodium absorption in the everted ileum segment of the rat. The plasma obtained from normovolemic dogs after angiotensin II was infused for 60 min caused a significant increase in sodium transport. Vasopressin was added to the serosal solution during the experimental hour to give a concentration equivalent to that found *in vivo* following a 20% hemorrhage. There were no consistent or significant changes in the movement of sodium. It is concluded that the experimental evidence supports the hypothesis that following contraction of the blood volume there is a change in the composition of the plasma that does significantly affect the absorption of sodium in an everted rat segment. This mechanism present in the intestine, then, should complement the role of the kidney in the homeostatic regulation of total body sodium.

1658 CARBOXYLIC ACID ABSORPTION IN THE CAECAL WALL OF THE RABBIT. *(Fr.)* Marty, J.; Carles, J. (Inst. Physiol., Toulouse, France). *Ann. Biol. Anim. Biochem. Biophys.* 13(3):453-464, 1973.

1659 MOLECULAR SPECIFICITY AND EFFECT OF CARBOHYDRATES ON CALCIUM ABSORPTION. *(Fr.)* Fournier, P.; Dupuis, Y.; Fontaine, N.; Sevette, A. M. (Lab. Res. Nutritional Factors Ossification, Practical Sch. Higher Studies, Paris, France). *J. Physiol. (Paris)* 66(4):473-477, 1973.

1660 COMPARISON OF ^{115m}CADMIUM RETENTION IN RATS FOLLOWING DIFFERENT ROUTES OF ADMINISTRATION. *(E.)* Moore, Jr., W.; Stara, J. F.; Crocker, W. C.; Malanchuk, M.; Iltis, R. (EPA, Environ. Toxicol. Lab., Cincinnati, Ohio). *Environ. Res.* 6(4):473-478, 1973.

1661 EXAMINATION OF AMINO ACIDS IN ILEAL DIGESTA AS A MEASURE OF PROTEIN DIGESTION. *(E.)* Bayley, H. S.; Cho, C. Y.; Holmes, J. H. G. (Dept. Nutr., Univ. Guelph, Canada). *Fed. Proc.* 33(1):94-99, 1974.

1662 REGULATION OF IRON ABSORPTION. *(E.)* Van Campen, D. (U.S. Plant, Soil Nutr. Lab., USDA, Ithaca, N.Y.). *Fed. Proc.* 33(1):100-105, 1974.

1663 STUDIES ON AMINO ACID UPTAKE BY OVINE SMALL INTESTINE. *(E.)* Johns, J. T.; Bergen, W. G. (Dept. Anim. Husbandry, Michigan State Univ., East Lansing). *J. Nutr.* 103(11):1581-1586, 1973.

1664 INHIBITORY EFFECT OF CHOLESTYRAMINE ON THE ABSORPTION OF FLUFENAMIC AND MEFENAMIC ACIDS IN RATS. *(E.)* Rosenberg, H. A.; Bates, T. R. (Sch. Pharm., State Univ. New York, Buffalo). *Proc. Soc. Exp. Biol. Med.* 145(1):93-98, 1974.

1665 VALIDATION OF THE RATIO METHOD FOR CALCULATING ABSORPTION OF DIETARY CHOLESTEROL IN MAN. *(E.)* Sodhi, H. S.; Kudchodkar, B. J.; Varughese, P.; Duncan, D. (Dept. Med., Univ. Saskatchewan, Saskatoon, Canada). *Proc. Soc. Exp. Biol. Med.* 145(1):107-111, 1974.

1666 DIPHENYLHYDANTOIN: EFFECTS ON CALCIUM METABOLISM IN THE CHICK. *(E.)* Villareale, M.; Gould, L. V.; Wasserman, R. H.; Barr, A.; Chiroff, R. T.; Bergstrom, W. H. (Upstate Med. Ctr., Syracuse, N.Y.). *Science* 183(4125):671-673, 1974.

1667 UPTAKE OF ω-AMINO ACIDS BY RAT SMALL INTESTINE AND KIDNEY CORTEX IN VITRO. *(E.)* Evered, D. F.; Hargreaves, B. M. C. (Dept. Biochem., Chelsea Coll., London, England). *Xenobiotica* 3(11):753-757, 1973.

1668 THE EFFECT OF COPPER AND CADMIUM ON ^{65}zn ABSORPTION IN ZINC-DEFICIENT AND ZINC-SUPPLEMENTED RATS. *(E.)* Evans, G. W.; Grace, C. J.; Hahn, C. (Human Nutr. Lab., USDA, Grand Forks, N.D.). *Bioinorganic Chem.* 3(2):115-120, 1974.

1669 FUNCTIONAL-METABOLIC CHANGES IN THE DIGESTIVE ORGANS IN EXPERIMENTAL DYSTROPHY OF THE WALL OF THE STOMACH. *(Rus.)* Vasilenko, Y. K.; Ivanova, M. S. (Pyatigorsk Inst. Balneol. Physiother.). *Biull. Eksp. Biol. Med.* 76(11):47-49, 1973.

1670 STORAGE IRON KINETICS. V. IRON EXCHANGE IN THE RAT. *(E.)* Cook, J. D.; Hershko, C.; Finch, C. A. (Univ. Washington Sch. Med., Seattle). *Br. J. Haematol.* 25(6):695-706, 1973.

1671 A COMPARISON OF PHENYLALKYL- AND PHENOXYALKYLTRIMETHYLAMMONIUM AND TRIETHYLAMMONIUM SALTS: THEIR APPARENT MOLAL VOLUMES AT INFINITE DILUTION AND EFFECTS ON THE FROG RECTUS AND GUINEA-PIG ILEUM PREPARATIONS. *(E.)* Barlow, R. B.; Franks, F. M. (Dept. Pharmacol., Univ. Edinburgh, Scotland). *Br. J. Pharmacol.* 49(3):480-489, 1973.

1672 EVALUATION OF GASTRIC SECRETION AND SMALL INTESTINAL ABSORPTION IN PATIENTS WITH CHRONIC URTICARIA, ENDOGENOUS ESZEMA, AND ACNE ROSACHEA. *(Ger.)* Szarmach, H.; Kryszewski, A.; Filipuik, J. (Acad. Med., Gdansk, Poland). *Allerg. Immunol. (Leipz.)* 18(4):287-290, 1972.

See also, 1889, 1900, 1902, 1928, 1932, 2183, 2188, 2545

1673 COMPARISON OF THE EFFECTS OF PROSTAGLANDINS E_1, E_2 AND OF HYPOVOLUMIC HYPOTENSION ON THE LOWER ESOPHAGEAL SPHINCTER. *(E.)* Goyal, R. K.; Rattan, S.; Hersh, T. (Baylor Coll. Med., Houston, Texas). *Gastroenterology* 65(4):608-612, 1973.

The effects of prostaglandin E_2 and A_2 on the lower esophageal sphincter pressure are studied in 2 lightly anesthetized opossums. Intravenous injection of these agents as a single bolus caused a dose-dependent fall in the lower esophageal sphincter pressure. Prostaglandin (PG) E_2 was as potent as PGE_1 whereas PGA_2 was much less potent than the E compounds. The threshold dose of PGE_2 was 0.15 μg/kg and maximal effect was found with a dose of 1 μg/kg. Threshold dose of PGA_2 was 1 μg/kg. All these prostaglandins caused a transient drop in the blood pressure. The effect on lower esophageal sphincter was much prolonged. The duration of the effect was related to dose; higher doses generally caused longer reductions in lower esophageal sphincter pressure. Hypotension produced by hemorrhaging and by intravenous injection of sodium pentobarbital produced no change in the lower esophageal sphincter pressure suggesting that fall in blood pressure is not related to fall in the lower esophageal sphincter pressure.

1674 COLONIC MOTILITY IN THE CAT. IV. PERIPHERAL PATHWAYS MEDIATING THE EFFECTS INDUCED BY HYPOTHALAMIC AND MESENCEPHALIC STIMULATION. *(E.)* Rostad, H. (Inst. Neurophysiol., Univ. Oslo, Norway). *Acta Physiol. Scand.* 89(2):154-168, 1973.

The peripheral pathways by which the hypothalamus and mesencephalon influence the motility of the colon were studied in 73 cats by combining brain stimulation and peripheral nerve sectioning, and by use of autonomic blocking agents. Excitatory colonic effects induced from the hypothalamic sympatho-inhibitory area with concomitant blood pressure falls were mediated through the sympathetic lumbar colonic nerves, whereas excitatory responses with associated blood pressure rises were conveyed through the latter as well as through the parasympathetic pelvic nerves. The augmentatory colonic effects usually associated with blood pressure rise evoked from the mesencephalon were conveyed through the colonic nerves only. The responses through the lumbar colonic and pelvic nerves were blocked by 4 mg/kg guanethidine and 0.5-1.0 mg/kg atropine, respectively. The augmentatory colonic responses from the hypothalamic sympatho-inhibitory area were blocked by 0.5-1.0 mg/kg of the beta-adrenergic blocking agent propranolol, whereas the effects from the other responsive hypothalamic areas, transmitted through the lumbar colonic nerves, were blocked by 2-4 mg/kg of alpha-blocker (phenoxybenzamine), but not by propranolol. This finding supports the presence of alpha-excitatory receptors in the colonic wall. Inhibition of colonic motility induced by hypothalamic and mesencephalic stimulation, were mediated through the lumbar colonic as well as through the splanchnic nerves. The effects were blocked by guanethidine, and those from the responsive hypothalamic zones were also blocked by propranolol.

1675 INTERACTIONS OF 5-HYDROXYTRYPTAMINE AND NARCOTIC ANALGESICS ON DOG INTESTINE IN VIVO. *(E.)* de Oliveira, L. F.; Sollero, L. (Dept. Pharmacol., Cidade Univ., Rio de Janeiro, Brazil). *Pharmacology* 10(5):291-297, 1973.

The effects of intra-arterially injected morphine and dextromoramide on 5-hydroxytryptamine induced contraction of the jejunum were studied in 38 mongrel dogs. Dextromoramide increased the intestinal contractile action of 5-hydroxytryptamine from 44.7 ± 8.8 cm H_2O to 154.6 ± 17.3 cm H_2O. This effect was reversible in about 15 min. The tryptamine antagonists LSD, BOL, dibenamine, and cyproheptadine failed in blocking 5-hydroxytryptamine and the narcotic analgesics. Atropine (50 μg/kg), however, was active in this respect. It is proposed that 5-hydroxytryptamine released by morphine acts on tryptamine receptors located on the ganglionar cells and is not blocked by LSD. Possibly morphine inhibits also the uptake of 5-hydroxytryptamine by the myenteric plexus which would explain the potentiation of exogenous 5-hydroxytryptamine.

1676 SOME CONTRACTILE AND ELECTROPHYSIOLOGICAL PROPERTIES OF THE EXTERNAL ANAL SPHINCTER MUSCLE OF THE CAT. *(E.)* Bowen, J. M.; Bradley, W. E. (Univ. of Minnesota Med. Center, Minneapolis). *Gastroenterology* 65(6):919-928, 1973.

The contractile properties of the external anal sphincter muscle of 13 cats were determined with the aid of a pressure-sensitive anal plug-transducer system. The mean contractile response of the indirectly stimulated sphincter was 52 mm Hg in cats anesthetized with 25 to 30 mg/kg sodium pentobarbital. Mean time from onset to peak of contraction was 45 msec for the sphincter response and 29 msec for the isometrically determined, contractile response of the tibialis anterior muscle in the same cats. Double contractile responses evoked by paired stimuli fused in the sphincter at longer stimulus intervals than in the tibialis anterior. These results indicate that the external anal sphincter is a slow twitch muscle. Complete paralysis of the tibialis anterior occurred before 50% block of the sphincter during constant infusion of 0.028 mg/kg/min tubocurarine. This difference in sensitivity is opposite that reported for slow twitch muscles, such as the soleus of the cat. The sphincter was more resistant to 0.056 mg/kg/min succinylcholine than the tibialis anterior. The sphincter was more susceptible to fatigue during tetanic stimulation than was the tibialis anterior. Distribution of action potentials evoked by unilateral indirect stimulation revealed that the sphincter is divided into right and left halves with end-plates concentrated in the region of the anal sacs. Miniature end-plate potentials were of the focal end-plate type, and were higher in amplitude, longer in time course, and slower in frequency than those recorded from the external intercostal muscle. True slow fibers were not present.

1677 REFLEX VAGAL INHIBITION OF ESOPHAGEAL MOTILITY. *(E.)* Abrahamsson, H.; Jansson, G. (Dept. Physiol., Univ. Goteborg, Sweden). *Acta Physiol. Scand.* 89(4):600-602, 1973.

eflex vagal inhibition of esophageal motility was tudied in 7 cats. Distensions of proximal parts of he esophagus were made by transient inflation of a cm latex balloon. Mechanical stimulation of the harynx to induce swallowing was performed with a orceps. The right vagus nerve was cut at the cerical level and its distal end put on electrodes for lectric stimulation. The following drugs were iven: atropine 0.5 mg/kg i.v., guanethidine 3 to mg/kg i.v. and gallamine thriethiodide in repeated oses of 5 mg/kg. Distension of cervical or upper horacic parts of the esophagus produced a prompt eflex inhibition of lower esophageal motility whenver rhythmic contractions were present; it had no learcut effect on resting pressure in the absence f rhythmic contractions. The inhibition of the ower esophageal pressure waves induced by upper sophageal distension was unaffected by gallamine hriethiodide. The inhibitory lower esophageal esponse also persists after administration of guanethidine in a dose capable of eliminating reflex drenergic inhibition of gastric motility. The induced pressure waves are themselves eliminated by tropine, indicating that they are dependent on a holinergic vagal mechanism. Mechanical stimulation f the pharynx with associated swallowing movements nhibited motility in the lower esophagus in the ame manner as distension of the proximal esophagus. The study indicates that esophageal smooth muscles re controlled by a nonadrenergic, noncholinergic eural mechanism.

678 EFFECT OF TRUNCAL VAGOTOMY AND PYLOROPLASTY ON GASTRIC EVACUATION AND SMALL BOWEL PROPULSION IN THE RAT.

(E.) Nilsson, F. (Dept. Surg., Univ. Hosp., Uppsala, Sweden). *Acta Chir. Scand.* 139(3):731-734, 1973.

Truncal vagotomy and pyloroplasty, or pyloroplasty alone, were performed in albino Sprague-Dawley rats, and at the same time a tube was placed in the duodenum. After 1 week, radio-iodinated polyvinylpyrrolidone was given in test meals to the stomach and to the duodenum. Two labels (^{131}I and ^{125}I) were used simultaneously and given via an oro-gastric tube and the duodenal tube. Gastric evacuation and small bowel propulsion were estimated from the distribution of the activities. Gastric evacuation was retarded by vagotomy but small bowel propulsion was unaffected. Pyloroplasty did not change the fraction of activity evacuated from the stomach nor did it influence small bowel propulsion.

1679 MANOMETRIC STUDY OF THE UPPER ESOPHAGEAL SPHINCTER IN NORMAL SUBJECTS AND CHANGES IT UNDERGOES IN THE PRESENCE OF GASTROESOPHAGEAL REFLUX.

(Sp.) Benages, A.; Ridocci, M. T.; Civera, R. G.; Parrilla, P.; Cosin, J. A.; Molina, R.; Garcia-Conde Comez, F. J. (Fac. Med., Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(2):149-160, 1973.

Pressure at the upper esophageal sphincter was measured on 26 patients with radiologically confirmed disphragmatic hernia (17 with and 9 without gastroesophageal reflux), 6 patients who had undergone surgery for diaphragmatic hernia at least 1 month before, 1 patient with Zenker's diverticulum, and 30 normal controls. Under resting conditions the maximum mean pressure at the upper esophageal sphincter was significantly higher in patients with diaphragmatic hernia and gastroesophageal reflux (21.66 ± 8.7 mm Hg) than in controls (8.43 ± 2.65 mm Hg), but no appreciable difference was found between patients with diaphragmatic hernia and no evidence of reflux and the controls. Pressure values were normal in patients who had undergone surgery for diaphragmatic hernia. It is suggested that increased pressure at the upper esophageal sphincter found in patients with gastroesophageal reflux represents a response to the presence of irritants in the esophagus and may be a defense mechanism to prevent their passage into the pharynx and respiratory tract. During swallowing the ratio between the duration of the positive oropharyngeal wave and the negative component of the esophageal sphincter (before the onset of its active contraction) was equal to or greater than unity in all but 2 patients (1 with Zenker's diverticulum and 1 with diaphragmatic hernia and gastroesophageal reflux). This lack of pharyngosphincterian synergism may be a contributing cause to development of Zenker's diverticulum.

1680 CHANGES OF COLONIC MOTILITY DURING EXPERIMENTAL OBSTRUCTION.

(E.) Zlatarski, G.; Lynen, F. K.; Willmen, H. R. (Inst. Emergency Care, Sofia, Bulgaria). *Rendic. Gastroenterol.* 5(2):85-89, 1973.

Changes of colonic motor activity were studied in 33 dogs during complete obstruction using electromanometric procedures. The surface and frequency changes of the colonic waves were correlated and evaluated. The number, amplitude, and duration of waves and the duration of activity were also computed. The experiments were conducted on 3 groups: Group A (8 dogs), 6 and 36 hr measurements of normal colonic motor activity carried out in 2 different segments of the sigmoid, comparing obstruction to motility; Group B (7 dogs), 36 hr measurements in complete colonic obstruction aiming at establishing colonic motor activity changes in early and progressing obstruction; and Group C (18 dogs), at 48, 72, and 96 hr, following experimentally induced complete obstruction, relaparotomy and 6 hr measurements were carried out to detect changes of colonic motility in long standing obstruction. During obstruction, there was an increase in motility which reached its peak at 30 hr. After 72 hr, a new peak of activity occurred which, while not reaching the values of the thirtieth hr, followed a 2-peaked course. Up to the thirthieth hr, motor activity of the distal segment was greater; after the thirtieth hr, motility in the proximal segment had considerably higher values. There was no linear relationship between increase of circumference and motility increase during obstruction. Reduced motility recorded in the macroscopically intact distal segment is probably caused by the lack of bolus stimulation and by the obstruction induced disruption of excitation impulses in the colonic wall. Above the obstruction level, the distension of the colonic wall is paralleled by motility increase during 30 and 72 hr when the greatest activity was also recorded.

1681 THE EFFECT OF BRADYKININ ON INTESTINAL MOTILITY AND BLOOD FLOW. *(E.)* Fasth, S.; Hulten, L. (Univ. of Goteborg, Sweden). *Acta Chir. Scand.* 139(8):699-705, 1973.

The effect of bradykinin on motility and blood flow in the small intestine and the colon was studied in 41 anesthetized cats. When administered intravenously, bradykinin caused a profound intestinal inhibition and a concomitant increase in blood pressure. Adrenalectomy abolished these responses, thus indicating that they were caused by a secondary release of catecholamines from the adrenal medulla. Close intra-arterial bradykinin-infusion to the intestine caused an atropine-resistant motility increase and a blood flow increase. The threshold bradykinin dose concerning vasodilatation was about 10 times lower than that producing increased motility. High bradykinin doses produced a marked intestinal contraction and only a transient blood flow increase, the motility response interfering mechanically with the blood flow. With respect to the colon the vasodilator and motility responses to high does of bradykinin mimicked closely those induced by pelvic nerve stimulation, lending support to the hypothesis that a kinin-like mechanism might be involved in functional hyperemia in the colon.

1682 A NOVEL APPROACH TO THE QUESTIONS OF ALLOSTERIC PROPERTIES OR A 'RECEPTOR RESERVE' OF DRUG BINDING SITES OF INTESTINAL SMOOTH MUSCLE CELLS. *(E.)* Kuhnen-Clausen, D. (Inst. Aerobiol., Fraunhofer Soc., Grafschaft/Sauerland, Germany). *FEBS Lett.* 39(1):61-66, 1974.

1683 EFFECTS OF A NEW BENZODIAZEPIN DERIVATIVE (BROMAZEPAM) ON ISOLATED INTESTINE FROM THE GUINEA PIG. *(It.)* Campese, V. M.; Cuomo, V.; Russo, R.; Marino, A. (2nd Dept. Pharmacol., Univ. Bari, Italy). *Boll. Soc. Ital. Biol. Sper.* 48(22): 807-809, 1972.

1684 EFFECTS OF DIPYRIDAMOLE ON THE ISOLATED INTESTINE OF THE GUINEA PIG. *(It.)* Campese, V. M. (2nd Dept. Pharmacol., Univ. Bari, Italy). *Boll. Soc. Ital. Biol. Sper.* 48(22):809-811, 1972.

1685 ANALYSIS OF THE PERISTALTIC REFLEX IN VITRO: EFFECTS OF SOME ENDOGENOUS TRANSMITTERS. *(E.)* Fontaine, J.; Reuse, J. J.; Van Nueten, J. M. (Lab. Pharmacodyn. Therap., Free Univ. Brussels, Belgium). *Arch. Int. Pharmacodyn. Ther.* 206(2):371-375, 1973.

1686 THE BINDING OF [^{3}H]-PROPYLBENZILYLCHOLINE MUSTARD BY LONGITUDINAL MUSCLE STRIPS FROM GUINEA-PIG SMALL INTESTINE. *(E.)* Burgen, A. S. V.; Hiley, C. R.; Young, J. M. (Natl. Inst. Med. Res., London, England). *Br. J. Pharmacol.* 50(1):145-151, 1974.

1687 INHIBITION OF INTESTINAL TONE, MOTILITY AND PROSTAGLANDIN BIOSYNTHESIS BY 5,8,11,14-EICOSATETRAYNOIC ACID (TYA). *(E.)* Willis, A. L.; Davison, P.; Ramwell, P. W. (Dept. Physiol., Stanford Univ., Calif.). *Prostaglandins* 5(4):355-368, 1974.

1688 EFFECT OF A MORPHINE-RABBIT ANTI-MORPHINE ANTIBODY MIXTURE ON GUINEA-PIG ISOLATED ILEUM. *(E.)* Bleiberg, M. J.; Janicki, B. W.; Leahy, W. V. C. (Woodard Res. Corp., Herndon, Va.). *Br. J. Pharmacol.* 49(4):721-723, 1973.

1689 THE EFFECT OF CANNABINOIDS ON INTESTINAL MOTILITY AND THEIR ANTINOCICEPTIVE EFFECT IN MICE. *(E.)* Chester, G. B.; Dahl, C. J.; Everingham, M.; Jackson, D. M.; Marchant-Williams, H.; Starmer, G. A. (Dept. Pharmacol., Univ. Sydney, Australia). *Br. J. Pharmacol.* 49:588-594, 1973.

1690 ANALYSIS OF THE PERISTALTIC REFLEX IN VITRO: EFFECTS OF SOME MORPHINE-LIKE DRUGS. *(E.)* Fontaine, J.; Reuse, J. J.; Van Nueten, J. M. (Lab. Pharmacodyn. Therap., Free Univ. Brussells, Belgium). *Arch. Int. Pharmacodyn. Ther.* 206(2):376-380, 1973.

1691 THE EFFECT OF CAERULEIN ON THE DIGESTIVE TRACT. *(It.)* Comino, E.; Fava, C.; Ragni, G.; Stoppa, I. M. (Radiol. Dept., Univ. Turin, Italy). *Minerva Med.* 64(89):4686-4691, 1973.

1692 THE DEPRESSANT ACTION OF SKF 525A ON THE GUINEA-PIG ILEUM. *(E.)* Krstic, M. K. (Fac. Med., Belgrade, Yugoslavia). *Arch. Int. Pharmacol.* 206(1):200-208, 1973.

1693 GASTRIC EVACUATION AND SMALL BOWEL PROPULSION MEASURED WITH A DOUBLE ISOTOPE TECHNIQUE. A METHODOLOGICAL STUDY IN THE RAT. *(E.)* Nilsson, F.; Jung, B.; Lundqvist, H. (Univ. Hosp., Uppsala, Sweden). *Acta Chir. Scand.* 139(8):716-723, 1973.

1694 GASTRIC EVACUATION AND SMALL BOWEL PROPULSION AFTER LAPAROTOMY. A STUDY WITH A DOUBLE ISOTOPE TECHNIQUE IN RAT. *(E.)* Nilsson, F.; Jung, B. (Univ. Hosp., Uppsala, Sweden). *Acta Chir. Scand.* 139(8):724-730, 1973.

1695 LIGHT AND ELECTRON-MICROSCOPIC INVESTIGATIONS ON THE INNERVATION OF THE MUSCULATURE OF THE COLON. *(E.)* Stach, W. (Anat. Inst., Rostock Univ., Germany). *Folia Morphol. (Warsz.)* 32(4): 457-467, 1973.

96 EFFECT OF ADRENERGIC BLOCKADE ON THE DUODENAL MOTOR REACTION INDUCED BY SOME IONS. *.)* Szalaj, W.; Stasiewicz, J.; Gabryelewicz, A. nst. Intern. Med., Bialystok, Poland). *J. Med.* 6):321-326, 1973.

97 EFFECTS OF PREGNANCY AND ASSOCIATED HORMONES IN MOUSE INTESTINE, IN VIVO AND IN VITRO. *.)* Datta, S.; Hey, V. M.; Pleuvry, B. J. (Dept. armacol., Univ. Manchester, England). *Pfleugers ch.* 346(2):87-95, 1974.

1698 THE INFLUENCE OF LONG-TERM INTERMITTENT EXPOSURES TO HYPOXIA ON GASTRIC EMPTYING TIME IN RATS. *(E.)* Fang, H. S.; Chen, C. F. (Coll. Med., Natl. Taiwan Univ., China). *Space Life Sci.* 4(3/4):335-337, 1973.

See also 1897, 2040, 2123, 2206

SECRETION AND METABOLISM

99 RELATIONSHIP OF SERUM GASTRIN TO PARATHYROID HORMONE SECRETION IN SHEEP. *(E.)* affe, B. M.; Peskin, G. W.; Kaplan, E. L. (Washington Univ., Sch. Med. St. Louis, Mo.). *Metabolism* 3(4):307-310, 1974.

ne influence of hypergastrinemia on secretion of arathyroid hormone was studied in sheep. Synthetic iman gastrin 1 (4-9 µg/kg/hr) was infused i.v. for hr into fasted, unanesthetized sheep. Blood was otained at 14-min intervals before, during, and fter infusion of gastrin from an indwelling arteral catheter. Blood pH, serum total calcium and irculating gastrin and parathyroid hormone (radiommunoassay) were determined. Despite the fact that astrin infusion resulted in marked hypergastrinemia id in a small but statistically significant derease in total serum calcium concentration (mean nange in serum calcium 0.28 mg/100 ml), parathyroid ormone concentrations after gastrin infusions (34 Eq/ml) did not change from basal (35). These studes do not substantiate the suggestion that acute ypergastrinemia, directly or indirectly, results n the release of parathyroid hormone.

700 ANTRAL REACTIVITY: EFFECT OF VAGAL INNERVATION ON ANTRAL GASTRIN RELEASE BY ARIOUS STIMULI. *(E.)* Bombeck, C. T.; Soji, K.; abrys, B. F.; Nyhus, L. M. (Univ. of Illinois Med. tr., Chicago). *Am. J. Surg.* 127(1):76-82, 1974.

he effects of preservation of antral innervation on he hormonal physiology of the antrum were studied n 4 adult mongrel dogs. Initially, each dog underent standard parietal cell vagotomy of the main ody of the stomach. The second operation consised of construction of a standard Heidenhain pouch. uring saline infusion, pH 7.0, into the isolated ntral pouch at #100 ml/hr, no significant change as noted in the base-line levels of acid secretion rom the Heidenhain pouch. Vagal blockade did not ncrease the level of secretion, suggesting that he small degree of distention produced in the ouch by this method of irrigation was not signifiant in gastrin release and that vagal blockade id not augment antral distention by decreasing ntral muscular tone. When the antral pouch was rrigated with 2% liver extract, pH 7.0, a secretory esponse was regularly measurable from the Heidenhain pouch. Both the magnitude of a resultant rise in serum gastrin levels were highly variable. When the antral pouch was irrigated with 0.5% acetylcholine, thereby releasing endogenous gastrin, a prompt response was noted in the secretory volume and acidity of the Heidenhain pouch. Vagal blockade decreased acid secretion and at the same time resulted in a small increase in the serum gastrin level. Pentagastrin (0.5 µg/kg/hr) irrigation of the antrum produced the same level of stimulation as that noted with 0.5% acetylcholine. When the isolated antral pouch was irrigated with saline at pH 7.0 and a plateau of secretion was established with 0.5 or 0.25 µg/kg/hr of exogenous pentagastrin, significant inhibition of output from the Heidenhain pouch was noted by changing the antral pouch irrigant to 0.1 N HCl, pH 1.0. Most long-term follow-up studies of patients after parietal cell vagotomy have demonstrated the presence of residual basal acid secretion to a greater or lesser degree. That the reduction of acid secretion is sufficient to allow a duodenal ulcer to heal is the basis of this operative procedure.

1701 THE GASTROINTESTINAL HORMONES. *(E.)* Russell, R. C. G. (St. Mary's Hosp., London, England). *J. R. Coll. Surg. Edinb.* 19(1):13-18, 1974.

1702 GASTRIN AND INSULIN HYPOGLYCAEMIA. A REVIEW OF STUDIES ON GASTRIN DETERMINATION AND HYPOGLYCAEMIC RELEASE OF GASTRIN IN MAN. *(E.)* Stadil, F. (Rigshosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(suppl. 23):1-49, 1974.

1703 CEREAL INGESTION AND CATECHOLAMINE EXCRETION. *(E.)* Hoeldtke, R. D.; Wurtman, R. J. (Massachusetts Inst. Technol., Dept. Nutr., Cambridge). *Metabolism* 23(1):33-41, 1974.

1704 ISOLATION AND PARTIAL CHARACTERIZATION OF GLYCOPEPTIDES FROM HUMAN PAROTID AMYLASE A. *(E.)* Watanabe, S.; Keller, P. J. (Dept. Oral Biol., Univ. Washington, Seattle). *Biochim. Biophys. Acta* 336(1):62-69, 1974.

1705 SYMPATHETIC VASODILATATION IN THE SUBMAXILLARY GLAND AND ITS ENHANCEMENT AFTER CHRONIC PARASYMPATHETIC DENERVATION. *(E.)* Schachter, M.; Barton, S.; Karpinski, E. (Dept. Physiol., Univ. Alberta, Edmonton, Canada). *Experientia* 29(12): 1498-1499, 1973.

1706 STABILIZATION OF PAROTID FLOW RATE IN THE DOG. *(E.)* Haroz, C. T.; Shannon, I. L. (Univ. Texas Health Sci. Ctr., Houston). *J. Dent. Res.* 53(1):20-22, 1974.

See also 1669

SECRETION AND METABOLISM

Stomach

1707 ALTERATIONS IN SECRETORY PATTERNS FOLLOWING VAGOTOMY IN RATS WITH PAVLOV OR HEIDENHAIN POUCHES. *(E.)* Lundell, L.; Svensson, S. E. (Inst. Physiol. Univ. Lund, Sweden). *J. Physiol.* 234(3):703-721, 1973.

In conscious female Sprague-Dawley rats provided with Pavlov or Heidenhain pouches, the acid and pepsin secretion in response to feeding and i.v. infusion of gastrin was established before and after truncal vagotomy. In Pavlov pouches the responses to 2-deoxy-D-glucose, methacholine and the combination of gastrin and methacholine were also studied. Interdigestive secretion of acid and pepsin after vagotomy was decreased in the Pavlov pouch and increased in the Heidenhain pouch. The acid response to feeding in the Pavlov pouch was substantially reduced after vagotomy, whereas the secretion of pepsin was only slightly diminished. In the Heidenhain pouch after vagotomy, feeding augmented the high interdigestive secretion. After vagotomy, the acid dose-response curve to gastrin was shifted to the right in the Pavlov pouch and to the left in the Heidenhain pouch. In the Pavlov pouch after vagotomy, the acid response to the highest dose of methacholine (64 μg/hr) employed was significantly enhanced. A background infusion of methacholine (10 μg/hr) reestablished in the Pavlov pouch the reduced responsiveness to gastrin following vagotomy. Pepsin secretion was stimulated by gastrin in the Heidenhain pouch and after vagotomy in the Pavlov pouch. The stimulatory effect of methacholine on pepsin secretion in the Pavlov pouch was increased after vagotomy.

1708 EFFECT OF PARTIAL DEHYDRATION OF EX VIVO CANINE STOMACH ON SECRETORY FUNCTION. *(E.)* Kowalewski, K.; Jirsch, D. W.; Kolodej, A. (Surg.-Med. Res. Inst., Univ. Alberta, Edmonton, Canada). *Eur. Surg. Res.* 5(3):216-227, 1973.

Isolated whole canine stomachs were dehydrated for 4 hr then perfused *ex vivo* with homologous blood from living supporting dogs. Dehydration was produced by vacuum, during which temperatures fell to -3 C. During the perfusion period, the stomachs were stimulated intraarterially with histamine (150 μg/hr) and bethanechol chloride (500 μg/hr). The blood and gastric juice (30-min samples) were studied for various components. Perfusion lasted 6 to 8 hr. The secretory function of 7 dehydrated-perfused stomachs was compared with that of 7 stomachs perfused without prior preservation. Dehydration resulted in a loss of about 1/3 of the gastric tissue water. When the dehydrated, hypothermic stomach was connected with normothermic homologous perfusion blood, it regained its motility within 30 min and started to secrete H^+ and pepsin after a 30- to 90-min rest. After 5-8 hr of perfusion, all of the previously dehydrated stomachs regained their water content. The perfusion method used represents a model for assessing the functional viability of an organ preserved prior to transplantation. The viability and function of the parietal and chief cells of the gastric mucosa was retained despite prolonged anoxia and marked dehydration of the entire stomach.

1709 MARKED INHIBITION OF GASTRIC SECRETION BY TWO PROSTAGLANDIN ANALOGS GIVEN ORALLY TO MAN. *(E.)* Robert, A.; Nylander, B.; Andersson, S. (Upjohn Company, Kalamazoo, Mich.). *Life Sci.* 14(3):533-538, 1974.

Two prostaglandin analogs, 15(S)-15-methyl PGE_2, methyl ester, and 16, 16-dimethyl PGE_2 were administered to healthy, male volunteers, 22 to 30 years of age, for their possible effect in inhibiting gastric secretion. Both analogs, given orally, inhibited gastric secretion stimulated by pentagastrin, and the effect was dose dependent. The inhibition lasted for more than 4 hr, and no side-effects were noted at the doses used. When given intraduodenally, through a thin tube swallowed the night before, 15(S)-15-methyl PGE_2, methyl ester was more active than 16,16-dimethyl PGE_2. In view of their oral and prolonged activity, these analogs may have clinical potential in the treatment of peptic ulcer.

1710 EFFECT OF AN ELEMENTAL DIET ON GASTRIC SECRETION. *(E.)* Rivilis, J.; McArdle, A. H.; Wlodek, G. K.; Gurd, F. N. (Jewish Gen. Hosp., Montreal, Canada). *Ann. Surg.* 179(2): 226-229, 1974.

ne effect of an elemental diet on gastric acid
ecretion in the dog was studied. The diet contained
ubstantially the same amount of fat, protein and
arbohydrate as the dog food used in the control
eeds. Its composition (%w/v) was as follows: pro-
ein (equivalent in amino acids), 9.38; fat (20%
edium chain triglycerides), 14.29; carbohydrate
oy difference), 65.63. Vitamins and minerals were
resent in adequate quantities in the diet. Pavlov
ouches were constructed in anesthetized mongrel
ogs. Twelve control feeds were carried out with
10 g of Romar dog food. One day prior to the diet
xperiments, the dogs were fed only with the ele-
ental diet. Test meals of the elemental diet were
iven on the next 3 consecutive days. Two 15-min
ollections were made before all tests to ensure
ne dogs were secreting under basal conditions
nd then collections were made every 15 min for 3
r after each feed. The total 3-hr volume output
as reduced from control values of 47.46 ml to
).07 ml and the total 3-hr hydrogen output was
educed from control values of 6.17 mEq/liter to
.71 mEq/liter. After the first 15 min of feeding
nere was a marked reduction in both volume and
ydrogen ion output. As the hydrogen ion concentra-
ration decreased, the sodium concentration increased.
ne total 3-hr potassium and chloride outputs were
ignificantly diminished by the overwhelming drop
n secretory volume. The observed depression in
astric secretion could be the result of a reduc-
ion in the cephalic phase of gastric secretion or
y the reduced local stimulatory effects of the
redigested diet or both.

711 HISTOLOGY OF GASTRIC MUCOSA AND ITS SECRETORY ACTIVITY IN MAN. *(E.)*
arro, V.; Karacsony, G.; Pach, E. (Univ. Med. Sch.,
zeged, Hungary). *Acta Med. Acad. Sci. Hung.*
)(3-4):291-297, 1972.

ne histological picture of the fundic mucosa ob-
ained by blind biopsy was compared with the HCl
ecretory capacity of the same stomach in 144 male
nd 120 female clinical patients. HCl production
fter histamine injection was noticeably greater
n subjects with normal mucosa than in patients
ith different forms of gastritis. In the latter
ne production of HCl decreased parallelly with
ne severity of gastritis. The thickness of the
ctive parenchymal layer reflects the degree of
ne morphological and functional damage of the
ucosa more characteristically than do the values of
ne full thickness of the mucosa. The decrease in
ne number of active parenchymal cells follows the
everity of the morphological lesions. Among the
landular constituents, the chief cells seem to be
elatively most sensitive to progressive gastritis.

712 SYNTHESIS OF DOPA IN RAT STOMACH FOLLOWING INGESTION OF CEREALS. *(E.)* Hoeldtke, R.
.; Wurtman, R. J. (Dept. Nutr. Food Sci., Massachu-
etts Inst. Technology, Cambridge). *Metabolism*
3(1):25-31, 1974.

The cereal-containing chow routinely consumed by male Sprague-Dawley laboratory rats contains both free dihydroxyphenylalanine (DOPA) and an enzyme that catalyzes the conversion of tyrosine to DOPA. When tyrosine-^{3}H (1.8 μCi) was added to this food (0.5 g) and incubated for 2 hr, 1.26% of the tyrosine-^{3}H was converted to DOPA-^{3}H. When the tyrosine-^{3}H was incubated with the gastric contents from an animal that had ingested the rat food, 0.8% of the tyrosine-^{3}H was converted to DOPA. If the gastric contents were boiled prior to the incubation, or if the animals consumed a diet lacking cereals, little or no DOPA-^{3}H was synthesized. The 24-hr excretion of free and conjugated dihydroxyphenylacetic acid was much higher among animals ingesting the cereal-containing rat food than among rats whose diet contained casein as the sole protein source. These findings suggest that the tyrosine-hydroxylating enzyme in cereals continues to catalyze DOPA synthesis within the lumen of the rat stomach.

1713 EFFECT OF HISTAMINE AND ITS METHYL DERIVATIVES ON CYCLIC AMP METABOLISM IN GASTRIC MUCOSA AND ITS BLOCKADE BY AND H_2 RECEPTOR ANTAGONIST. *(E.)* Dousa, T. P.; Code, C. F. (Mayo Clin., Rochester, Minn.). *J. Clin. Invest.* 53(1):334-337, 1974.

In a cell-free system prepared from guinea pig gastric mucosa, histamine and N^α-methylhistamine produced dose-dependent stimulation of cyclic AMP formation and 1,4-methylhistamine had a minimal stimulatory effect. *N*-methyl-*N*'-(2-[5-methylimidazole-4-yl-methylthio]-ethyl)-thiourea (metiamide), a new H_2 receptor inhibitor, selectively blocked the stimulation of adenylate cyclase by histamine and its active methyl derivative but had no substantial effect on the basal adenylate cyclase activity or adenylate cyclase stimulated by sodium fluoride. Metiamide inhibited the histamine stimulation of adenylate cyclase at 1/100 the concentration of the histamine. Histamine, its methyl derivatives, and metiamide did not influence the activity of cyclic AMP phosphodiesterase from gastric mucosa. Therefore, histamine stimulates gastric mucosal adenylate cyclase via interaction with the H_2 receptor without influencing cyclic AMP breakdown and *N*-methylation of histamine on the side chain preserves or even increases its stimulating ability. *N*-methylation in the ring nearly abolishes the ability of histamine to interact with the H_2 receptor.

1714 THE RELATIONSHIP BETWEEN GASTRIC SECRETORY INHIBITION AND CEREBRAL AND GASTRIC LEVELS OF MONOAMINES IN PYLORUS-LIGATED RATS. *(E.)* Yamaguchi, I.; Katsuki, S.; Ohashi, T.; Kumada, S. (Fujisawa Pharm. Co., Osaka, Japan). *Jap. J. Pharmacol.* 23(4):523-534, 1973.

Neuroleptics, antidepressants, and minor tranquilizers, including chlorprothixene, octoclothepine, perphenazine, levomepromazine, chlorpromazine, haloperidol, molindone, desipramine, amitryptyline, imipramine, prazepam, chlordiazepoxide, pentolinium bitartrate, atropine sulfate, reserpine, tetrabenazine, tensibar, and DL-*p*-chlorophenylalanine, were compared quantitatively for their effects on gastric secretion in Shay rats and on barbiturate sleep in mice. It was shown that these 2 actions of neuroleptics are clearly related. The tricyclic neuroleptics, phenothiazines, chlorprothixene, and octoclothepine had the most potent antisecretory activity in centrally acting drugs, neuroleptics, antidepressants and minor tranquilizers. Centrally acting drugs all prolonged barbiturate sleeping time in mice in decreasing potency as follows: tricyclic neuroleptics, butyrophenones, benzodiazepines, antidepressants, and molindone. The anti-secretory action of neuroleptics and antidepressants was reduced in rats pretreated with reserpine (5 mg/kg, s.c.). Gastric secretion in Shay rats was clearly enhanced following a single injection of reserpine. The secretory volume and antisecretory activity of chloropromazine after reserpine returned to control levels concomitantly with the recovery of the cerebral levels of norepinephrine and serotonin and gastric levels of norepinephrine. Anti-secretory activity of imipramine and gastric levels of serotonin recovered more rapidly after reserpine treatment. It is postulated that the cerebral rather than gastric norepinephrine inhibits gastric secretion in Shay rats and is presumbaly involved in the antisecretory effect of chlorpromazine, and also possibly that of neuroleptics and antidepressants.

1715 EFFECT OF PARTIAL AND TOTAL VAGOTOMY ON THE GASTRIC ACID RESPONSE TO AN INSULIN INFUSION IN THE DOG. *(E.)* Dozois, R. R.; Kirkpatrick, J. R. (Dept. Clin. Surg., Univ. Edinburgh, Scotland). *Ann. Surg.* 179(1):12-16, 1974.

The effect of partial and total vagotomy on the gastric acid response to an insulin infusion was studied in 4 mongrel male dogs. Total vagotomy completely abolished, while partial vagotomy significantly reduced (57%) the acid response to an insulin infusion in the dog. The reduced acid response after partial vagotomy was noted to be graded with doses of insulin producing submaximal acid responses. These findings indicate that the stomach does not respond in an all-or-none fashion to vagal stimulation and support the notion of a segmental innervation of the parietal cell mass below the esophageal plexus.

1716 MANGANESE INDUCED HISTOCHEMICAL AND HISTOLOGICAL ALTERATIONS IN GASTROINTESTINAL MUCOSA OF GUINEA PIGS. *(E.)* Chandra, S. V.; Imam, Z. (Industrial Toxicol. Res. Ctr., Lucknow, India). *Acta Pharmacol. Toxicol.* 33(5/6):449-458, 1973.

Manganese-induced histochemical and histological alterations were studied in gastrointestinal mucosa of 70 male guinea pigs. Manganese chloride (10 mg/kg) was administered orally to guinea pigs for a period of 30 days. The histochemical and histological alterations in gastric mucosa consisted of loss of mucin and pepsinogen granules, adenosine triphosphatase and glucose-6-phosphatase activities and patchy necrosis of the epithelium. The intestinal villi also showed patchy necrosis, the activities of adenosine triphosphatase and glucose-6-phosphatase were diminished while there was an increase in the activity of acid phosphatase in the mucosa. Excess of manganese in the gastrointestinal tract produces functional and structural alterations in the mucosal cells. The exact mechanism of action needs further study. It is concluded that the loss of ATPase and glucose-6-phosphatase activity in the gastrointestinal mucosa in the experiments indicates impairment of metabolic activity of the cell under the toxic influence of manganese.

1717 INTERACTION OF NITRITE WITH PROTEINS AT GASTRIC pH. *(E.)* Knowles, M. E.; McWeeny, D. J.; Couchman, L.; Thorogood, M. (Food Res. Inst., Norwich, England). *Nature* 247(5439): 288-289, 1974.

The products obtained from the interaction of nitrite with bovine serum albumin under simulated gastric conditions are reported. The reaction was carried out in unbuffered solutions, the pH being adjusted initially to 2.5 and allowed to rise during the reaction to 4.0 to 4.5, thus simulating normal gastric pH changes during digestion. Bovine serum albumin (1 g) in dilute hydrochloric acid (10 ml; initial pH 2.5) was treated with sodium nitrite (0.069 g) in a stoppered flask, with stirring at 37 C for 2 hr. The resulting yellow solution was immediately dialysed and freeze dried. Weighed amounts of the pale yellow powder were hydrolysed with 6N hydrochloric acid under nitrogen. Acidic and neutral amino acids were analyzed automatically by ion exchange chromatography and peak areas were analyzed by computer. 3-Nitrotyrosine and dopa are identified from the reaction and are postulated to be degradation products of 3-nitrosotyrosine, and the ε-amino groups of lysine are deanimated to yield 6-hydroxynorleucine concurrently. This series of reactions shows that apart from nitrosamime formation, there are other nitrosation reactions involving nitrit in foodstuffs, which could take place under stomach conditions and yield modified amino acids.

1718 THE ACTIONS OF BOMBESIN ON GASTRIC SECRETION IN THE DOG AND THE RAT. *(E.)* Bertaccini, G.; Erspamer, V.; Impicciatore, M. (Inst. Pharmacol., Univ. Parma, Italy). *Br. J. Pharmacol.* 49(3):437-444, 1973.

The effects of bombesin, the tetradecapeptide occurring in the skin of the European discoglossid frogs *Bombina bombina* and *Bombina variegata variegata*, on the secretory activity of the stomach of the dog and rat are described. Bombesin stimulated acid secretion from the denervated fundic pouch of the dog. Whereas the concentration of hydrochloric acid in bombesin-produced juice was always higher than in control juice this did not occur for pepsin, the concentration of which remained below the basal values. The threshold dose of bombesin was 5-30 ng/kg by the s.c. route and 0.05-0.2 (μg/kg)/h by i.v. infusion. At low doses, bombesin was more active than caerulein, even on a molar basis, and at high dose levels was as active as caerulein. In contrast o gastrin and caerulein, bombesin elicited a oderate secretory response also following rapid i.v. njection. The acid secretion provoked by bombesin as almost completely inhibited by atropine and educed by approximately 50% by hexamethonium. ombesin did not stimulate acid secretion in the umen-perfused preparation of the rat stomach when dministered by s.c. injection (up to 10 μg/kg) r by i.v. infusion (up to 10 μg/kg hour). An rregular increase in acid output was observed nly following rapid i.v. injection and this was f doubtful significance. Preliminary experiments ave shown that both in dogs and man, gastric cid secretion elicited by bombesin was always ccompanied by a conspicuous increase of immunoeactive gastrin activity in plasma. This would point o the possibility that bombesin is a gastrineleasing factor.

719 GASTRIC CHEMISTRY: INTERPRETATION OF THE PENTAGASTRIN TEST. *(Fr.)* Archambault, .; Thibert, F. (Maisonneuve Rosemont Hosp., ontreal, Canada). *Union Med. Can.* 102(12): 501-2503, 1973.

1720 SYNTHESIS OF IODINE-CONTAINING GASTRIN PEPTIDES. *(Rus.)* Martynov, V. F.; Samartsev, M. A. (Leningrad State Univ., USSR). *Khim. Prirodn. Soedinenii* (4):568, 1973.

1721 STARVATION AND GASTRIN STORAGE IN THE PYLORIC ANTRAL MUCOSA OF MALE RABBITS. *(E.)* Olowo Okorun, M. O. (Physiol. Dept., Univ. Ibadan, Nigeria). *Experientia* 29(12):1511-1512, 1973.

1722 KINETICS OF GASTRIC RESPONSE IN CHICKENS TO GRADED ELECTRICAL VAGAL STIMULATION. *(E.)* Gibson, R. G.; Colvin, Jr., H. W.; Hitschowitz, B. I. (Dept. Med., Univ. Alabama, Birmingham). *Proc. Soc. Exp. Biol. Med.* 145(3):1058-1060, 1974.

See also 1648, 2120, 2125, 2129, 2130, 2134, 2144

SECRETION AND METABOLISM

Pancreas

723 PERFUSION OF THE ISOLATED PANCREAS IN THE DOG: COMPARISON OF THE EFFECT OF SECRETIN ND PANCREOZYMIN ON EXOCRINE PANCREATIC SECRETION. *Fr.)* Stock, C.; Stoebner, P.; Kachelhoffer, J.; renier, J. F. (Unit Exp. Surg. Biophysiopathol. ntestine, INSERM, Strasbourg, France). *Ann. Biol. lin. (Paris)* 31:377-385, 1973.

ancreatic enzyme secretion and ultrastructure were nvestigated in isolated dog pancreas before and fter intraarterial injection of secretin (30 U) and ancreozymin (25 U). Isolated pancreases were perused for 2.5 hr. Both secretin and pancreozymin mmediately increased the volume of pancreatic juice ecreted and the enzyme output. Secretin increased he volume of the juice to 30 times the control value nd pancreozymin, to 5 times the control value. Panreozymin increased amylase and lipase outputs to 0 and 12 times, resp., the control values, while ecretin produced only a 3-fold increase. Within 0 min of stimulation secretin caused 30% decrease nd pancreozymin a 50% decrease in the number of cells ith zymogen granules, but initial values were ttained again after 40 min. A progressive decrease n the number of zymogen granules occurred again uring the last 30 min of perfusion. It is conluded that both secretin and pancreozymin increase ancreatic enzyme secretion by stimulating release f zymogen granules into the lumen of pancreatic cini.

724 CHILD ABUSE AND TRAUMATIC PSEUDOCYST OF THE PANCREAS. *(E.)* Pena, S. D. J.; Medovy, H. (Dept. Paediatr., Univ. Manitoba, Winnipeg, Canada). *J. Pediatr.* 83(6):1026-1027, 1973.

Between 1958 and 1972, 13 children with proven pancreatic trauma were seen at the Winnipeg Children's Hospital. In 9 of these children, a pseudocyst of the pancreas was demonstrated, and 3 of these 9, child abuse was proven or strongly suspected. The case histories of the abused children, all under 3 yr of age, are presented. Blunt abdominal trauma accounts for at least half of the reported cases of pseudocyst of the pancreas in children. When a pseudocyst of the pancreas is found in children under 3 yr of age and no acceptable explanation for its occurence is forthcoming the possibility of child abuse should be considered.

1725 THE RELATIONSHIP BETWEEN CALCIUM EXCHANGE AND ENZYME SECRETION IN THE ISOLATED RAT PANCREAS. *(E.)* Case, R. M.; Clausen, T. (Arhus Univ., Inst. Physiol., Denmark). *J. Physiol.* 235(1): 75-102, 1973.

The role of extracellular and intracellular Ca^{2+} in pancreatic enzyme secretion was assessed by correlating the exchange of ^{45}Ca with amylase secretion in the isolated uncinate pancreas of baby Wistar rats. The rate coefficient of ^{45}Ca efflux from pre-loaded glands declined continually, indicating that ^{45}Ca is retained in several different pools and reflecting changes in the concentration of cytoplasmic free ^{45}Ca. The rate coefficient of ^{45}Ca release was not influenced by extracellular Ca^{2+} or Mg^{2+} concentrations.

Cholecystokinin-pancreozymin and acetylcholine acclerated the release of both ^{45}Ca and amylase in a dose-dependent fashion, but did not affect the initial rate of ^{45}Ca uptake by the tissue. In Ca^{2+}-free media basal amylase secretion slowly declined and stimulated secretion was abolished, but the accelerated release of ^{45}Ca was maintained. Thus, natural stimuli of pancreatic enzyme secretion alter cellular ^{45}Ca distribution independent of extracellular Ca^{2+} and in association with amylase secretion if the plasma membrane is not depleted of Ca^{2+}. Secretin, glucagon and insulin did not influence ^{45}Ca release. Replacement of extracellular Na^+ by Li^+ increased the release of ^{45}Ca and amylase, but only in the presence of extracellular Ca^{2+}. Li^+-substitution also increased ^{45}Ca uptake. Hyperosmolarity accelerated ^{45}Ca release and amylase secretion. 2,4-Dinitrophenol accelerated ^{45}Ca efflux but not amylase secretion, indicating that a rise in cytoplasmic Ca^{2+} will not initiate secretion if energy metabolism is impaired. Cholecystokinin-pancreozymin slightly increased the rate coefficient of ^{42}K release, indicating a changed membrane permeability. The stimulation effects of cholecystokinin-pancreozymin and acetylcholine were suppressed during Na^+-substitution by Li^+. Thus, the Na^+ concentration gradient across the membrane is important in secretion. The primary action of cholecystokinin-pancreozymin and acetylcholine may be to increase the influx of Na^+ into the cell by changing membrane permeability. This would release Ca^{2+} from intracellular stores (probably endoplasmic reticulum), leading to a rise in Ca^{2+} concentration close to structures involved in enzyme secretion. Secretion then follows if the ATP is available and the plasma membrane is not depleted of Ca^{2+}.

1726 A MICROPUNCTURE INVESTIGATION OF THE WHOLE TISSUE MECHANISM OF ELECTROLYTE SECRETION BY THE IN VITRO RABBIT PANCREAS. *(E.)*

Swanson, C. H.; Solomon, A. K. (Harvard Med. Sch., Boston, Mass.). *J. Gen. Physiol.* 62(4): 407-429, 1973.

Micropuncture techniques have been used to examine electrolyte secretion by the *in vitro* New Zealand rabbit pancreas. The concentration profiles of the major secreted ions and digestive protein and the electrical potential profile within the pancreatic ductal system have been determined during spontaneous and secretin-stimulated secretion. The active transport of both Na and HCO_3 are the rate-controlling steps in primary secretion. Spontaneous secretion is produced primarily within the intralobular ducts. The anion composition of the primary secretion depends on the secretion rate with HCO_3 ranging from about 70 mEq/liter at low rates to about 110 mEq/liter at high rates. With secretin stimulation the smaller extralobular ducts also secrete and this extralobular secretion has a higher HCO_3 content than that of the intralobular secretion. In the main collecting duct the anion composition of the juice is modified further by Cl-HCO_3 exchange which appears to be a passive process depending on the average residence time of the juice in the main duct.

1727 INTRACELLULAR DISTRIBUTION OF CO-LIPASE AND FOLATE CONJUGASE IN THE RAT PANCREAS.

(E.) Arnesjo, B.; Erlansson, C.; Jagerstad, M.; Lindstrand, K. (Univ. Hosp., Lund, Sweden). *Scand. J. Gastroenterol.* 8(8):719-724, 1973.

The intracellular distribution of co-lipase and pteroylpolyglutamate hydrolase (folate conjugase) was studied, using isopycnic gradient centrifugation of rat pancreatic homogenates. By comparison with lipase, almost the same proportions of co-lipase, but smaller proportions of folate conjugase, were recovered from the zymogen granule fractions. The specific activities (activity/mg protein) for lipase and co-lipase were high in the zymogen granules, but for folate conjugase the specific activity was high in the zymogen granules as well as in the cell sap. This study allows the following conclusions to be drawn. The similar distribution of lipase, measured by these 2 different methods, indicates that the cofactor for lipase, co-lipase, is present within all subcellular fractions in which lipase is found. Lipase and co-lipase are distributed in an almost similar fashion among the subcellular components of the rat pancreas. The folate conjugate is apparently localized within zymogen granules and the cell sap of the rat pancreatic exocrine cells. Rat pancreatic folate conjugase is most likely an enzyme which is secreted into the duodenum via the pancreatic juice.

1728 EFFECT OF LANTHANUM ON ^{45}Ca FLUX AND SECRETION OF PROTEIN FROM RAT EXOCRINE PANCREAS. *(E.)*

Heisler, S.; Grondin, G. (Dept. Pharmacol., Univ. Sherbrooke, Quebec, Canada). *Life Sci.* 13(7):783-794, 1973.

The relationship between calcium flux and secretion of protein from female Sprague-Dawley rat exocrine pancreas was studied. The trivalent cation La^{3+} was used to measure ^{45}Ca uptake. Carbachol increased the uptake of ^{45}Ca into the tissue prior to onset of secretion of α-amylase. La^{3+} inhibited ^{45}Ca uptake in carbachol-stimulated tissue, and also inhibited secretion of protein from the pancreas. Carbachol increased the rate of efflux of ^{45}Ca from the pancreas independently of the presence or absence of La^{3+}. In the presence of La^{3+}, however, the net loss of ^{45}Ca from the tissue was reduced. The data suggest that La^{3+} inhibits ^{45}Ca influx into the pancreas and may additionally displace intracellular calcium.

1729 PYLORIC GLAND METAPLASIA OF THE HUMAN PANCREAS: A COMPARATIVE HISTOCHEMICAL STUDY. *(E.)*

Roberts, P. F. (Norfolk Norwich Hosp., Norwich, England). *Arch. Pathol.* 97(2):92-95, 1974.

1730 THE DISTRIBUTION OF MEMBRANE BOUND ENZYMES IN THE ACINI AND DUCTS OF THE CAT PANCREAS.

(E.) Wizemann, V.; Christian, A. L.; Wiechmann, J.; Schulz, I. (Max Planck Inst. Biophys., Frankfurt, Germany). *Pfluegers Arch.* 347(1):39-47, 1974.

31 ADAPTIVE AND NONADAPTIVE CHANGES IN
DIGESTIVE ENZYME CAPACITY INFLUENCING DI-
STIVE FUNCTION. *(E.)* Snook, J. T. (no affil.).
d. Proc. 33(1):88-93, 1974.

32 THE INFLUENCE OF INTRAVENOUS INFUSIONS OF
A NUTRIENT SOLUTION ON THE EXOCRINE PAN-
EAS. *(Ger.)* Frohlich, C.; Locher, M.; Olders-
usen, H. F. von (Med. Clin., Univ. Tubingen,
rmany). *Klin. Wochenschr.* 51(24):1207-1209, 1973.

See also 1629, 2262

SECRETION AND METABOLISM

Hepatobiliary Tract

33 INITIATION OF FREE RADICAL REACTIONS AND
HEPATOTOXICITY IN RATS POISONED WITH CARBON
TRACHLORIDE OR BROMOTRICHLOROMETHANE[1]. *(E.)*
rdino, E.; Gravela, E.; Ugazio, G.; Vannini, V.;
lligaro, A. (Inst. Gen. Pathol., Univ. Torino,
aly). *Agents Actions* 3(4):244-253, 1973.

e effect of bromotrichloromethane on radical re-
tions in male Wister rats was compared with the
patotoxicity produced by carbon tetrachloride. The
ectron paramagnetic resonance signal and the UV-
ectrum of double bond shifting in microsomal lipids
ow that $CBrCl_3$ administration induces a more rapid
d extensive free radical reaction in liver than
l_4. More severe pathological phenomena are coin-
dent with a more profound pro-oxidant effect of
omotrichloromethane. In fact, 0.26 mmol of $CBrCl_3$
ove lethal after having caused massive fatty liver
d necrosis, while an equimolecular amount of CCl_4
duces a lower and transient hepatic triglyceride
cumulation and necrosis. Under the same experi-
ntal conditions, the lethal dose of carbon tetra-
loride is 20 times higher (5.16 mmol per 100 g body
ight). CCl_4-poisoned rats develop a remarkable
ssociation of liver polysomes. In animals given an
uivalent dose of $CBrCl_3$ these damages occur within
shorter lag period and are more severe. Moreover,
e recovery takes place much later than when carbon
trachloride is used. A clear inverse relationship
ists between the level of bond dissociation energy
these 2 halogenoalkanes (respectively, 49 and 68
al mol^{-1}, for $CBrCl_3$ and CCl_4) and their potency
stimulate free radical reactions and to produce
ver injury.

'34 ENZYMATIC CHARACTERISTICS OF CO-SENSITIVE
26-HYDROXYLASE SYSTEM FOR 5β-CHOLESTANE-3
,7α,12α-TRIOL IN RAT LIVER MITOCHONDRIA AND ITS
NTRAMITOCHONDRIAL LOCALIZATION. *(E.)* Taniguchi,
.; Hoshita, N.; Okuda, K. (Hiroshima Univ. Sch.
ent., Japan). *Eur. J. Biochem.* 40(2):607-617, 1973.

he enzyme characteristics of the mitochondrial 26-
ydroxylase system for 5β-cholestane-3α,7α,12α-triol
ere studied in rat liver mitochondria and the inner
embrane-matrix fractions with special attention to
ntramitochondrial localization. The study indicated
hat rat liver mitochondria, as well as microsomes,
possessed the hydroxylase system for 5β-cholestane-3α,7α,12α-triol as an intrinsic constituent. Product analyses revealed that only the mitochondrial hydroxylase system was specifically active for C-26 position. In contrast, the microsomal system was apparently unspecific on C-26 position but slightly more active for other adjacent positions. Among the tested citric acid cycle intermediates and nicotinamide coenzymes, isocitrate and NADPH exerted the most remarkable enhancement of the 26-hydroxylase activity. NADP and NADH were totally inert under the assay conditons. Partial rupture of the mitochondrial structure by hypotonic or digitonin treatment was essential for the reactivity of the 26-hydroxylase system, and it improved accessibility to the intramitochondrial reacting site of the exogenous reactants such as NADPH, isocitrate and 5β-cholestane-3α,7α,12α-triol in particular. The NADPH-dependent or isocitrate-dependent 26-hydroxylase system was insensitive to inhibitors of the respiratory electron transfer such as potassium cyanide, antimycin A, rotenone and amytal. However, it was specifically inhibited by phenyl isocyanide. The 26-hydroxylase system was remarkably sensitive to carbon monoxide. Apparent Michaelis constant for oxygen and partition coefficient (between carbon monoxide and oxygen) of the 26-hydroxylase system were estimated to be approximately 10-20μM and 0.1, resp. Thus, the possible functioning of a "cytochrome P-450"-like entity in intramitochondrial 26-hydroxylase system was proposed. The localization of 26-hydroxylase system was assigned to the inner membrane-matrix region, on the basis of the distribution of intramitochondrial marker enzymes during the course of serial solubilization by digitonin.

1735 CARBON TETRACHLORIDE INDUCED LIVER ALTERATIONS IN RATS PRETREATED WITH N,N'-DIPHENYL-p-PHENYLENEDIAMINE. *(E.)* Comporti, M.; Benedetti, A.; Casini, A. (Inst. Gen. Pathol., Univ. Pisa, Italy). *Biochem. Pharmacol.* 23(2):421-432, 1974.

Glucose-6-phosphatase activity of liver microsomes was decreased 15 min following carbon tetrachloride administration (0.25 ml/100 g by gastric intubation) to male Sprague-Dawley rats, but it was unaffected at 5 minutes. At the latter time, however, lipid peroxidation was already detectable in liver microsomal lipids. Pretreatment with N,N'-diphenyl-p-phenylenediamine (DPPD #3 i.p. doses of 60 mg/100 g) prior to CCl_4 poisoning did not prevent the peroxidation of microsomal lipids induced *in vivo* by carbon tetrachloride. Nor did it suppress the depression of glucose-6-phosphatase. Malonic dialdehyde production by liver homogenates or the microsome plus supernatant fraction was decreased by the addition of DPPD *in vitro* even at concentrations of 1.5×10^{-5} and 1.5×10^{-6} M. The *in vitro* pro-oxidant effect of CCl_4 was suppressed only when DPPD was present at the concentration of 1.5×10^{-4} M. Pretreatment of rats with DPPD significantly decreased the liver steatosis induced by carbon tetrachloride but did not prevent the fall in plasma triglyceride caused by the halogenated hydrocarbon. The effect of DPPD on the liver steatosis was manifested both when DPPD was administered in oil and when it was given as an aqueous suspension. In the former instance was DPPD found in appreciable amounts in the microsomal lipids, while in the latter case it occurred only in traces in the microsomal fraction. It is suggested that the ability of DPPD to decrease CCl_4-induced liver triglyceride accumulation is not related to an action of DPPD on the membranes of the endoplasmic reticulum of the liver cell.

1736 LIVER MICROSOMAL HYDROXYLATION OF STEROID HORMONES AFTER ESTABLISHING AN INDIGENOUS MICROFLORA IN GERMFREE RATS.

(E.) Einarsson, K.; Gustafsson, J. A.; Gustafsson, B. E. (Karolinska Inst., Stockholm, Sweden). *Proc. Soc. Exp. Biol. Med.* 145(1):28-52, 1974.

The liver microsomal metabolism of 4-(4-^{14}C)androstene-3,17-dione and 5α-(4-^{14}C)androstane-3α,17β-diol was studied in germfree, conventional and exgermfree rats with a normal indigenous microflora. Germfree rats were significantly more active than conventional rats in hydroxylating 4-androstene-3, 17-dione in positon 6β and 5α-androstane-3α, 17β-diol in position 2β, 7α and 18. In addition 7α-, 16α- and 16β-hydroxylation of 4-androstene-3,17-dione and 2α- and 7β-hydroxylation of 5α-androstane-3α,17β-diol tended to be greater in germfree rats than in conventional rats. In most cases the exgermfree rats, which had been reared outside the germfree isolators for 4 weeks, showed similar activities of the microsomal hydroxylase systems as their conventional counterparts. Thus, exgermfree rats showed significantly less efficient 16β-hydroxylation of 4-androstene-3,17-dione and 2β- and 7α-hydroxylation of 5α-androstane-3α,17β-diol than germfree rats. The results show that the induced state of certain microsomal hydroxylase systems in germfree rats is reversible and dependent on the metabolic changes in the germfree rat consecutive to the absence of the normal indigenous microflora.

1737 MASSIVE LETHAL HEPATIC NECROSIS IN RATS ANESTHETIZED WITH FLUROXENE, AFTER MICROSOMAL ENZYME INDUCTION.

(E.) Harrison, G. G.; Smith, J. S. (Dept. Anaesthetics, Univ. Cape Town, South Africa). *Anesthesiology* 39(6):619-625, 1973.

A group of 10 female Wistar rats were pretreated with phenobarbital (50 mg/kg/day, i.p.) for 3 days, and, on day 4, were anesthetized with fluroxene at a concentration of 3% in oxygen with a flow rate of 5 liter/min for 1 hr. This program was repeated 3 times. A second group received phenobarbital (80 mg/kg/day) for 3 days, and, on day 4, were anesthetized with fluroxene for 3 hr. After the first 1 hr exposure, 6 of the 10 rats in the first group died. All 10 rats in the second group died during or immediately after the 3 hr exposure to fluroxene. The livers were enlarged and showed massive central and midzonal necrosis. The remaining 4 animals from the first group, though sick after exposure, recovered and survived two further 1 hr exposures. Treatment with phenobarbital (50 mg/kg/day) increased cytochrome P450 levels by a factor of 1.5; phenobarbital treatment (80 mg/kg/day), by a factor of 2.6. No rat died in control groups anesthetized with fluroxene without enzyme induction, but the livers all showed demonstrable histologic changes, most notably a feathery degeneration of the cytoplasm with widespread vacuolation. These results indicate that fluroxene anesthesia in the rat in the presence of increased levels of hepatic cytochrome P450 caused a rapidly lethal fulminant hepatic necrosis and that fluroxene anesthesia alone caused histologic changes in the liver. Evidence to date suggests that it is some reaction in or metabolite resulting from the biotransformation of fluroxene which is the toxic agent. It is suggested that free radical formation or epoxidation of the vinyl radical of fluroxeneas a step in the transformation to carbon dioxide may take place and result in lipid peroxidation of the cell organelle membranes, leading to the observed massive cell destruction. It is urged that fluroxene anesthesia not be used for patients receiving drugs having enzyme-inducing properties.

1738 DIETARY REGULATION OF FATTY ACID SYNTHETASE AND MICROSOMAL GLYCEROPHOSPHATE ACYLTRANSFERASE ACTIVITIES IN RAT LIVER.

(E.) Wiegand, R. D.; Rao, G. A.; Reiser, R. (Dept. Biochem. Biophys., Texas A & M Univ., College Station). *J. Nutr.* 103(10):1414-1424, 1973.

The response of rat hepatic soluble fatty acid synthetase and microsomal glycerophosphate acyltransferase to qualitative and quantitative differences in dietary fat was studied. The effects on these enzymes of fasting and feeding after a fast were also studied. Fatty acid synthetase activities of livers of rats consuming either fat-free, 2.5% or 5.0% cocoa butter diet for 1 week were equal. However, 2.5% and 5.0% safflower oil diets reduced fatty acid synthetase activities by 25% and 40% respectively, and stock diet or fasting for 3 days reduced it 20% and 5%, respectively. Refeeding fat free 5.0% safflower oil or 5.0% cocoa butter for 2 days following a 3-day fast resulted in a 50- to 60-fold increase in fatty acid synthetase activity. Maximum activities of synthetase were reached between days 2 and 3 of refeeding regardless of the type of diet. Fat in the diet, saturated or unsaturated, did not inhibit this adaptive increase in fatty acid synthetase activity during the first few days. How-

er, at day 7 of refeeding there was a highly sig-
ficant drop in fatty acid synthetase activities
rats fed 5.0% safflower oil while that of those
d either fat-free or 5.0% cocoa butter remained
gh. Standard microsomal glycerophosphate acyl-
ansferase assay conditions were developed using
crosomes from rats maintained on a stock diet.
der these conditions the average specific activity
the acyltransferase was 5.2 nmoles phosphatidic
id synthesized per minute per milligram microsomal
otein. Glycerophosphate acyltransferase was not
gnificantly different after fasting for 3 days,
gestion of diets containing 2.5%, 5.0%, 10% and
% safflower oil or cocoa butter nor after stock or
t-free diets. However, refeeding the fat-free 5.0%
fflower oil or 5.0% cocoa butter diets for 2 days
llowing a 3-day fast increased its activity by
% over the prefasting or fasting levels. It re-
rned to the prefasting level between days 3 and 5
the refeeding period. These studies show that the
patic glycerophosphate acyltransferase activity
relatively constant while the fatty acid synthe-
se activity varies with qualitative and quantita-
ve dietary fat differences.

39 INFLUENCE OF DEHYDROCHOLATE ON HEPATIC
UPTAKE AND BILIARY EXCRETION OF ROSE BEN-
. IN THE RABBIT. *(E.)* Kelman-Sraer, J.; Erlin-
, S.; Peignoux, M.; Benhamou, J. P. (Hosp. Beau-
, Clichy, France). *Biomedicine* 19(9):415-418,
73.

e influence of sodium dehydrocholate on hepato-
iary elimination of radio-iodinated rose bengal
the rabbit was studied to determine the site
ere competition between bile acids and phthalein
es occurs. A compartmental analysis of the plasma
sappearance curve of ^{131}I-rose bengal after a
ngle injection was performed in a control group of
animals and in 2 groups of 6 animals receiving
ydrocholate infusions (6 and 10 μmol/min/kg,
sp.). The results indicate that under dehydro-
olate infusions the fractional transfer rate of
I-rose bengal from the plasma to the liver was
gnificantly decreased. The fractional transfer
te of ^{131}I-rose bengal from the liver to the bile
s significantly increased. These modifications
re dose-dependent. These findings suggest that
mpetition between bile acids and rose bengal oc-
rs for uptake by the hepatic cells and that
erefore the uptake processes for the 2 compounds
e at least partly common. The results further
ggest that competition between bile acids and
se bengal does not occur for biliary excretion.
ere could be a stimulation of the biliary excre-
ry mechanism of rose bengal by dehydroxycholate
its metabolites).

0 ENDOGENOUS STEROID SULFATES AND GLUCURON-
IDES IN THE GALLBLADDER BILE FROM EARLY
MID-TERM HUMAN FOETUSES. *(E.)* Huhtaniemi, I.
ept. Med. Chem., Univ. Helsinki, Finland). *J.
locrinol.* 59(3):503-510, 1973.

e neutral steroids derived from their conjugates
a pool of bile from 20 human fetuses were analysed by gas-liquid chromatography and gas chromatography-mass spectrometry. No free steroids were found, however, 10 monosulfates, 12 disulfates, and 7 glucuronides were detected. Both saturated and unsaturated steroids of the C_{19}- and C_{21}- series were detected. The glucuronides of 5β-pregnane-3α,20α-diol, 5α-pregnane-3β,16α,20α-triol and 3α-hydroxy-5β-pregnan-20-one as well as the monosulfate of 16α-hydroxydehydroepiandrosterone were present in the highest concentrations. Other major components were the monosulfates of dehydroepiandrosterone, pregnenolone and 16 -hydroxypregnenolone and the disulfates of 5-androstene-3β,17α-diol, 3β,17β-dihydroxy-5-androsten-16-one and 5β-pregnane-3ξ,20α,21-triol. The total concentration of the monosulfate conjugates was 435 μg/100 g sample (wet weight), of the disulfates 363 μg/100 g and of the glucuronides 815 μg/100 g. Many of these compounds have been found in fetal liver and intestinal contents. Therefore, during early and mid-gestation the fetal liver is apparently already excreting many steroid conjugates through the biliary tract into the intestinal canal. As in other fetal compartments, considerable amounts of steroid sulfates were detected. However, the steroid glucuronides in the bile suggest that the formation of hepatic glucuronides already occurs during this period.

1741 STIMULATION OF TAURODEOXYCHOLATE 7α-HYDROXYLASE OF RAT LIVER BY ADENOSINE 3':5'-MONOPHOSPHATE AND SATURATED FATTY ACIDS. *(E.)* Prager, G. N.; Voigy, W.; Hsia, S. L. (Univ. Miami Sch. Med., Fla.). *J. Biol. Chem.* 248(24):8442-8448, 1973.

Tauro [24-^{14}C]deoxycholate was incubated with liver microsomes from male Sprague-Dawley rats to demonstrate 7α-hydroxylation of taurodeoxycholic acid. Following hydrolysis of the conjugated bile acids, radioactive cholic acid was identified as the major product of the reaction. The taurodeoxycholate 7α-hydroxylase system required NADPH and molecular oxygen for activity. The activity was inhibited by carbon monoxide and this inhibition could be reversed by light, suggesting cytochrome P-450 involvement. Addition of the 105,000 x g supernatant to the microsomes stimulated 7αhydroxylation of taurodeoxycholate. Cyclic adenosine 3':5'-monophosphate also stimulated the 7α-hydroxylation. However, the amount of the nucleotide present in the supernatnat fraction could account for only 30% of its stimulatory activity. The dialysate of the supernatant was fractionated, and the fraction containing fatty acids, but free of cyclic adenosine 3':5'-monophosphate also possessed also possessed stimulatory activity. Palmitic, stearic, and linoleic acids were the major fatty acids in this fraction. Saturated fatty acids with chain lengths of C_{12} to C_{20} stimulated, while long chain unsaturated fatty acids inhibited the 7α-hydroxylation. Saturated fatty acids reversed the inhibition by unsaturated fatty acids. The stimulatory effects of cyclic adenosine 3':5'-monophosphate and palmitic acid were additive when their concentrations were less than producing maximal stimulation. Maximal stimulation by either cyclic adenosine 3':5'-monophosphate, palmitate, or the supernatant fraction was comparable. The fatty acid content of the 105, 000 x g supernatant was sufficient to account for maximal stimulation.

1742 STUDIES ON THE ETHANOL-INDUCED DECREASE OF FATTY ACID OXIDATION IN RAT AND HUMAN LIVER SLICES. *(E.)* Blomstrand, R.; Kager, L.; Lantto, O. (Karolinska Inst., Stockholm, Sweden). *Life Sci.* 13(8):1131-1141, 1973.

Mechanisms involved in acute ethanol-induced liver triglyceride accumulation have been investigated. Oxidation, esterification, and β-keto acid formation were examined in male Sprague-Dawley rat and human liver slices after incubation with albumin bound, long chain fatty acids (palmitic, oleic, and linoleic acids). Alcohol added to rat and human liver slices depressed the formation of $^{14}CO_2$ from palmitic acid-1-^{14}C, oleic acid-1-^{14}C and linoleic acid-1-^{14}C. Esterification to triglycerides and phospholipids was increased and the formation of β-keto acids was decreased by alcohol. The alcohol effect on the lipid metabolism of the liver slices was almost prevented by 4-methylpyrazole. Therefore, oxidation of alcohol is obligatory for the decreased β-oxidation of fatty acids, the increased esterification and for the decreased formation of β-keto acids. The results suggest that ethanol oxidation inhibits β-oxidation of fatty acids and that this primary effect leads to accumulation of liver triglycerides by increased esterification of plasma free fatty acids. It is suggested that a high rate of ethanol oxidation may be a factor in the development of acute liver triglyceride accumulation.

1743 THE EFFECT OF PHENOBARBITAL ON CHOLESTEROL GALLSTONES IN HAMSTERS. *(E.)* Lagarriga, J.; Bouchier, I. A. D. (Roy. Free Hosp., London, England). *Gut* 14(12):956-961, 1974.

The influence of phenobarbital on bile chemistry and gallstone formation was studied in 70 male golden hamsters (Cricetus aureatus), aged 5 weeks. Phenobarbital (400 mg/kg/day) were administered to the hamsters that were receiving a diet known to induce cholesterol gallstones. After a 28-day period none of the control animals had gallstones whereas 5 of 12 animals with added phenobarbital developed stones. Ten of 19 animals on the lithogenic diet formed gallstones but when phenobarbital was added gallstones occurred in 16 of 19 hamsters. The administration of phenobarbital resulted in the production of bile which was relatively more saturated with cholesterol of 24.8 in control animals altering to 9.1 in animals receiving phenobarbital. Hepatic bilirubin uridine diphosphate-glucuronyl transferase activity was not increased in animals on phenobarital. It was concluded that, in the hamster at least, there is no indication that large doses of phenobarbital will reduce the potential for gallstone formation. Many variables will need to be considered before it can be established that phenobarbital will alter bile composition to favor dissolution of gallstones in man.

1744 ROLE OF HEPATIC BILE COMPOSITION IN GALLSTONE FORMATION IN BABOONS. *(E.)* McSherry, C. K.; Morrissey, K. P.; Javitt, N. B.; Glenn, F. (New York Hosp., N. Y.). *Ann. Surg.* 178(5):669-675, 1973.

The lipid composition of hepatic bile was studied in normal and gallstone-forming baboons to evaluate the role of cholesterol solubility in the pathogenesis of cholesterol gallstones. Both groups of animals secreted hepatic bile supersaturated with cholesterol. In cholecystectomized animals food intake, estrogens, corticosteroid (methylprednisolone), and the oral ingestion of cholesterol and lecithin failed to exert a significant effect on the lipid composition or cholesterol solubility of hepatic bile. Bile salt administration in the form of sodium taurocholate increased bile salt excretion by the liver into hepatic bile with concomitant increase in the solubility of cholesterol. A distinction was made between basal and stimulated hepatic bile flow. Basal bile flow is the type of bile secreted by the liver after 90% of the bile salt pool has returned to the gallbladder. Stimulated bile flow occurs during the reabsorption from the intestines and secretion into bile of 90% of the pool. In the former, cholesterol is present in the supersaturated state whereas in the latter it is less than saturated. Following removal of the gallbladder, bile salt absorption from the gastrointestinal tract and secretion by the liver into hepatic bile is constant and the lipid composition of hepatic bile resembles stimulated bile flow. The efficacy of cholecystectomy in interrupting the course of calculous biliary tract disease is explained by the change in hepatic bile flow from alternating basal and stimulated bile flow to a state of constant stimulated flow.

1745 INFLUENCE OF CLOFIBRATE (ETHYL-4-CHLOROPHENOXYISOBUTYRATE) ON HEPATIC DRUG METABOLISM IN MALE RATS. *(E.)* Lewis, N. J.; Witiak, D. T.; Feller, D. R. (Coll. Pharm., Ohio State Univ., Columbus). *Proc. Soc. Exp. Biol. Med.* 145(1):281-285, 1974.

Elevations in liver weight, liver/body weight, and microsomal protein content associated with chronic clofibrate administration in male albino Harlan Wistar rats were found to be dependent upon the age of the animals. Pretreatment with clofibrate significantly reduced pentobarbital and zoxazolamine sleeping times in a dose-dependent manner and enhanced the rates of microsomal metabolism for pentobarbital, ethylmorphine and aminopyrine. Specific activities of microsomal enzymes involved with the hydroxylation of zoxazolamine or aniline remained unaffected via chronic drug administration. The metabolism of all drug substrates were significantly increased via pretreatment with clofibrate when the results were expressed on the basis of total liver protein. The microsomal rates of ethylmorphine and minopyrine N-demethylation were significantly greater in treated animals when compared to control values, while the microsomal hydroxylation of aniline was unaffected by clofibrate pretreatment. Clofibrate administrated elevated the microsomal cytochrome P-450 content. It is concluded that the extrapolation of drug-drug interactions with clofi-

ate in man based upon the selection of one or two
ugs may be misleading.

46 INFLUENCE OF FLUOROCARBON EMULSIONS ON HEPATIC METABOLISM IN PERFUSED RAT LIVER.

.) Goodman, M. N.; Parrilla, R.; Toews, C. J.
arvard Med. Sch., Boston, Mass.). *Am. J. Physiol.*
5(6):1384-1388, 1973.

e abilities of erythrocyte-free Krebs-Ringer-
carbonate buffer, erythrocyte-Krebs-Ringer-bicar-
nate buffer, and fluorocarbon-Krebs-Ringer-bicar-
nate buffer emulsions to maintain a viable per-
sed rat liver preparation were compared. At flow
tes of 30 ml/min, alanine gluconeogenesis, oxygen
nsumption, lactate and ketone body production, and
patic ATP concentrations were the same with all 3
ffer preparations. The cytosolic and mitochon-
ial redox states, as indicated by the hepatic
ctate:pyruvate and beta-hydroxybutyrate: aceto-
etate ratios, resp., were also the same with the
different buffers. However, at flow rates of 20
/min or less, the fluorocarbon-Krebs-Ringer-bicar-
nate and the erythrocyte-Krebs-Ringer-bicarbonate
ffers were superior to the erythrocyte-free buffer
e to their greater oxygen-carrying capacity. It
concluded that the fluorocarbon-Krebs-Ringer-bi-
rbonate and erythrocyte-Krebs-Ringer-bicarbonate
ffers are virtually identical in their ability to
intain a viable functioning perfused rat liver
eparation. No harmful effect was noted due to
e fluorocarbon emulsion on the tissue, however,
is not certain whether fluorocarbons interfere
th other vital events occurring in the liver.

47 LIVER REGENERATION AND URAEMIA. *(E.)*

Chen, T. S. N.; Leevy, C. M. (Coll. Med.
nt. New Jersey, Newark). *Br. J. Exp. Pathol.*
(6):591-596, 1973.

t experiments indicate that chemical antagonism to
A synthesis may account for the decrease in liver
ll replication and lymphocyte responsiveness en-
untered in liver disease and uremia. Investiga-
ons in male Sprague-Dawley rats of the incorpora-
on of [^{3}H]thymidine into DNA following CCl_4-induced
ver injury indicate that uremia decreases DNA syn-
esis in hepatocytes, mesenchymal cells, and lympho-
tes. Uremia had no effect on the severity of the
patic necrosis and CCl_4 (0.1/100g) did not signi-
cantly change the level of serum urea in nephrec-
mized animals. Dialysis or heating of uremic plas-
at 56° for 30 minutes abolished its suppressant
fect on hepatic DNA synthetic capacity. These ob-
rvations indicate that chemical inhibition of DNA
nthesis in uremia is responsible for alterations
hepatocytes and lymphocyte replication. Both
decrease in immunocompetence and reduced liver
generation in uremia may result from this chemical
fect. The specific factor or factors in uremic
asma responsible for reduced DNA synthesis remain
identified. However, preliminary data indicate
at the factors are dialysable and thermolabile.
is considered unlikely that urea, creatinine, or
anidosuccinic acid could account for the depression
of cellular DNA synthesis in renal failure since the first two have no effect on test results and the latter is stable at 56°.

1748 SUBMICROSOMAL DISTRIBUTION OF HEPATIC DRUG-METABOLIZING COMPONENTS IN THE GUNN RAT.

(E.) Guarino, A. M.; Reagan, R. L.; Gram, T. E. (Natl. Cancer Inst., Bethesda, Md.). *Pharmacology* . 10(5):257-271, 1973.

The submicrosomal distribution of a number of enzymes involved in the metabolism of xenobiotics was studied in livers of Wistar and Gunn rats. Compared with Wistar controls, ethylmorphine demethylase activity and cytochrome P-450 levels in smooth microsomes of homozygous Gunn rats were significantly decreased (about 20%). Both heterozygous and homozygous Gunn rats exhibited significantly elevated (20-60%) NADPH cytochrome c reductase activities in both smooth and rough microsomal fractions. UDP-glucuronyltransferase activity measured with phenolphthalein as substrate was barely detectable (< 10% of Wistar control) in smooth or rough microsomes of homozygous Gunn rats, but was only slightly reduced in the heterozygous animals. It is concluded that this report has offered evidence that in addition to decreased UDPGT activity there is also a slight impairment of nonglucuronidating drug-metabolizing pathway such as N-dealkylation in the Gunn rat. The dominant ethylmorphine demethylase activity was found in the smooth microsomal fractions of all three strains of rats, and the decreased ethylmorphine demethylase activity in the homozygous Gunn rats (20%) correlated well with the decreased levels (18%) of cytochrome P-450 levels. Such lowered drug-metabolizing capacity toward this substrate is associated with decreases in levels of cytochrome P-450.

1749 METABOLIC CHANGES INDUCED BY ETHANOL IN MUSCLE AND LIVER TISSUE OF THE RAT IN VIVO.

(E.) Fellenius, E.; Bjorkroth, U.; Kiessling, K. H. (Inst. Zoophysiol., Univ. Uppsala, Sweden). *Acta Chem. Scand.* 27(7):2361-2366, 1973.

The metabolic changes in the liver and skeletal muscle of female Wistar rats after infusion of ethanol into the rat *in vivo* were studied. Samples of the liver and muscle tissue were taken simultaneously by the freeze-clamp technique and analyzed for content of lactate, pyruvate, α-glycerophosphate, dihydroxyacetonephosphate, malate, adenine nucleotides, inorganic phosphate, creatinephosphate and creatine. The changes in the redox-state in the cytoplasm and mitochondria of the liver were measured as the [lactate]/[pyruvate]-ratio, and the [β-hydroxybutyrate]/[acetoacetate]-ratio, respectively. The ratios in the liver varied with the total amount of ethanol infused. The [lactate]/[pyruvate]-ratio of the muscle was not affected by the oxidation of ethanol. Thus the reduced state of the liver caused by the oxidation of ethanol and which partly can be exported to extrahepatic tissues will be re-adjusted in the resting muscle cell. The [β-hydroxybutyrate]/[acetoacetate]-ratio of the liver was, however, not restored to its normal value in the muscle. This was probably due to a low activity of the β-hydroxybutyrate dehydrogenase in the muscle. The changes of the adenine nucleotides were mainly in the level of AMP. These changes occurred both in the liver and in the muscle tissue and were related to the metabolism of acetate, the main product during oxidation of ethanol in the liver.

1750 RATE-LIMITING FACTORS IN ETHANOL OXIDATION BY ISOLATED RAT-LIVER PARENCHYMAL CELLS. EFFECT OF ETHANOL CONCENTRATION, FRUCTOSE, PYRUVATE AND PYRAZOLE.

(E.) Grunnet, N.; Quistorff, B.; Thieden, H. I. D. (Dept. Biochem., Univ. Copenhagen, Denmark). *Eur. J. Biochem.* 40(1):275-282, 1973.

Isolated rat-liver parenchymal cells from female Wistar rats oxidized ethanol at a rate of 1.4, 1.7, 1.9, and 2.5 μmol/min/ml packed cells at 4, 20, 40, and 65 mM ethanol, resp. Between 40 and 65 nM ethanol an abrupt 30% increase in the ethanol oxidation rate was noted. The activity of the NAD-dependent alcohol dehydrogenase in a homogenate of isolated cells corresponded to 1.25-5U/ml packed cells, depending on the assay method used. Fructose or pyruvate enhanced oxidation rate of ethanol by 1.4-2.0 μmol/min/ml packed cells independent of the ethanol concentration applied. No additive effect of the 2 compounds was observed. Pyrazole inhibited NAD dependent alcohol dehydrogenase activity in a homogenate of isolated cells as well as the unstimulated and the fructose-stimulated ethanol oxidation with a K_i-value of 9-13 μM. Pyrazole concentrations which inhibited the unstimulated ethanol oxidation only 30% inhibited the "frustose effect" 100%, indicating that the "fructose effect" is mediated via alcohol dehydrogenase. Pyrazole (4mM) only slightly inhibited that part of the ethanol oxidation not catalyzed by alcohol dehydrogenase, whereas pyrazole (18 mM) inhibited this pathway significantly. Pyrazole (50 M) had no effect on the basal ethanol oxidation rate, whereas the fructose-stimulated ethanol oxidation was 30% inhibited. At low concentrations of ethanol and in the absence of fructose, the rate-limiting step in ethanol oxidation appears to be dissociation of the enzyme-NADH complex. Fructose (or pyruvate) metabolism indirectly activates this dissociation by an increased rate of NADH oxidation, probably mediated via the "malic enzyme shuttle". Thus, in the presence of fructose or pyruvate, the maximal activity of ethanol dehydrogenase may be rate-limiting for the oxidation of ethanol. These results suggest that enzyme systems other than alcohol dehydrogenase participate in ethanol oxidation at high ethanol concentrations.

1751 BILIARY TRANSPORT OF SODIUM CHLORIDE: DEMONSTRATION OF THE EXISTENCE OF ACTIVE SODIUM TRANSPORT BY PERFUSED RAT LIVER.

(Fr.) Vanlerenberghe J.; Trupin, N.; Capon, C.; Nguyen, M. (Fac. Med., Univ. Lille, France). *Arch. Int. Physiol. Biochim.* 81(3):469-475, 1973.

To establish the action mechanism involved in the secretion of sodium in the bile, a study was made of bile secretion when rat liver was perfused with high concentrations of NaCl (20 mEq/liter) in the absence and presence of ouabain (1 x 10^{-4}M). The decrease in bile secretion which occurred immediately after addition of NaCl to the perfusion fluid was about the same in the presence and absence of ouabain (14% and 17%, resp.). This decrease lasted only 15 min, after which bile secretion normalized and then rapidly and progressively decreased again. The mean volume of bile secreted was significantly lower in the presence of ouabain than in its absence. Although the time required to reach equilibrium was about the same, the difference between the sodium concentration of perfusion fluid and that of bile was significantly greater in the presence of ouabain. Simultaneous addition of NaCl and ouabain to the perfusion fluid had no effect either on the difference between chloride concentrations in the perfusion fluid and bile or on the time required to reach equilibrium. The decrease which occurred in the volume of bile secreted, the concentration of sodium in the bile, and the sodium output can be accounted for by inhibition of (Na^+, K^+)ATPase by ouabain. These results support the hypothesis that sodium is actively transported from the blood to the bile.

1752 EFFECTS OF ESTROGEN UPON BILE: IMPLICATIONS WITH RESPECT TO GALLSTONE FORMATION.

(E.) Lynn, J.; Williams, L.; O'Brien, J.; Wittenberg, J.; Egdahl, R. H. (Boston Univ. Med. Ctr., Mass.). *Ann. Surg.* 178(4):514-524, 1973.

The effects of estrogens on hepatic bile flow and composition in awake female Rhesus monkeys with minimal interruption of the entero-hepatic circulation was investigated. The gallbladder was excluded from the system by double ligation of the cystic duct. Estriol (2, 4, or 8 mg/kg, i.v.) was administered in single dose. The 8 mg dose caused the greatest reduction in bile flow over 12 hr, the mean control level of 93.7 ml fell to 30.3 ml. Similarly the 8 mg dosage caused the greatest reduction in bile salt secretion, from 2.70 millimoles to 0.68 millimoles. Under control conditions a linear relation was observed between bile flow and bile salt secretion. The relation remained linear throughout the dose range. The intercepts of the plot of the hourly bile volume against bile salt secretion cut the verticle axis at a positive value, indicating that some proportion of bile salt is independent of bile flow. At all doses the 12 hr secretion rate of cholesterol and phospholipids was reduced, but not significantly. The only dose resulting in a significant reduction of the 12 hr phospholipid secretion was the 8 mg dose. There were dramatic changes in the relative composition of the bile at all dose levels. Estriol did not change the osmotic effect of a micromole of bile salt. Therefore, the fluid presented to the ductal system had a normal osmolarity even though bile salt secretion had been altered by estriol. From the viewpoint of gallstone formation, the most significant effects of estrogens are reflected by changes in the relative composition of bile. The induction of lithogenic bile occurred primarily through a reduced secretion of bile salts

ich was proportionately greater than the reduction
cholesterol and phospholipid secretion. Such
thogenic bile, when exposed to the well defined
liary tree stasis which occurs in pregnancy, may
sult in precipitation of microcrystals of choles-
rol, yielding to subsequent stone growth.

53 PARALLELISM BETWEEN MECHANICAL AND METABOLIC RESPONSES TO CHOLECYSTOKININ AND
STAGLANDIN E_2 IN EXTRAHEPATIC BILIARY TRACT.

) Andersson, K. E.; Andersson, R.; Hedner, P.;
sson, C. G. A. (Dept. Pharmacol., Univ. Lund,
den). *Acta Physiol. Scand.* 89(4):571-579, 1973.

mechanical effects of the prostaglandins E_1, E_2,
F_{2a} were investigated *in vitro* in isolated prep-
tions of guinea-pig gallbladder, cat gallbladder,
cat sphincter of Oddi. The actions of the pros-
landins, and particularly the effects of pros-
landin E_2, proved similar to those of cholecys-
inin, *i.e.* contraction of the gallbladder and re-
ation of the sphincter of Oddi were produced; the
ponses were not influenced by tetrodotoxin or by
ckade of adrenoceptors or cholinoceptors. In
anesthetized cat, prostaglandin E_2 increased
intraluminal gallbladder pressure and decreased
resistance to flow through the sphincter of
i. The contractile responses in guinea pig gall-
dder after prostaglandin E_2 were preceded by a
rease in the tissue levels of cyclic AMP and
activation of phosphodiesterase. The relaxation
duced by prostaglandin E_2 in the cat sphincter
Oddi was associated with an increase in the cyclic
content of the tissue, despite an increased
sphodiesterase activity. These metabolic changes
e similar to those observed in response to chole-
tokinin. These experiments showed that the
hanical effects of cholecystokinin on the extra-
atic biliary tract could be mimicked by the pros-
landins E_1, E_2, and F_{2a}, and of these most con-
tently by prostaglandins E_2. Similar to the ac-
ns of cholecystokinin, the prostaglandin induced
ponses were not influenced by pretreatment with
opine or by effective blockade of the adrenorecep-
functions in the gallbladder and in the sphinc-
of Oddi. These findings seem to exclude involve-
t of cholinoceptors and adrenoceptors in the me-
tion of the effects. The inability of tetrodotox-
to influence the effects of the prostaglandins
gests that these substances act directly on the
oth muscle cells without involvement of neuronal
ments.

54 EFFECTS OF ETHANOL ON MEMBRANE LIPIDS III. QUANTITATIVE CHANGES IN LIPID AND
TY ACID COMPOSITION OF NONPOLAR AND POLAR LIPIDS
MOUSE TOTAL LIVER, MITOCHONDRIA AND MICROSOMES
LOWING ETHANOL FEEDING.

(E.) Miceli, J. N.
w York Univ. Med. Ctr., N.Y.). *Lipids*
2):722-727, 1973.

effects of chronic ethanol consumption on the
els of various nonpolar and polar lipids and
nges in the composition of fatty acids associated
h these lipids were studied in the livers of male
ss-Webster mice. Mice (20) fed ethanol for 21
days had 12.7% more lipid in the total liver than controls, resulting from an increase in nonpolar lipids exceeding the loss in polar lipids. Mitochondria, however, had a loss of 23.4% total lipid attributable to losses in polar lipids. Microsomes had a loss of 25.1% lipid, resulting from losses of both nonpolar and polar lipids. The increase in the total liver of nonpolar lipids was primarily due to cholesterol esters which increased 300%. The loss of polar lipids can be attributed to choline phosphoglyceride and ethanolamine phosphoglyceride with losses in each case representing more than 5%. Mitochondrial and microsomal polar lipid losses also were due to choline and ethanolamine phosphoglycerides. Diphosphatidyl glycerol increased in all cases, even to a surprisingly high percentage in the total liver and microsomes. Triglyceride decreased in total liver and subcellular fractions, the greatest change occurring in the microsomes (15% total lipid). The amount of arachidonic (20:4) and docosahexaenoic acids (22:6) decreased in all lipids containing them in the total liver, mitochondria, and microsomes of the ethanol treated mice except in the choline phosphoglyceride of mitochondria where 20:4 increased. The large increase in cholesterol esters in the total liver and mitochondria is primarily oleic acid (18:1). Results of this study indicate that in both the mitochondria and microsomes of alcohol treated mice, a change has occurred in fatty acid distribution of the major lipids, which lends support to the hypothesis of enzyme hydrolysis. Also of significance were the increases in stearic acid content (18:0) of various lipids in the total liver and mitochondria of ethanol fed mice. It has been suggested that the decrease observed in liver mitochondria was due to decreases in the activity of the chain elongation-destruction system which converts linoleate to arachidonate. Since liver CoA content is decreased markedly by ethanol, a decrease in the activity of the enzyme system seems a logical explanation.

1755 POLYSACCHARIDES IN HUMAN GALLBLADDER WALL AND BILE.

(E.) Terho, T.; Laitio, M. (Dept. Physiol. Pathol. Anat., Univ. Turku, Finland). *Biochim. Biophys. Acta* 338(1):135-150, 1974.

Polysaccharides in human gallbladder wall and bile were isolated and characterized. In the gallbladder wall hyaluronic acid, heparan sulphate, dermatan sulphate and chondroitin 4- and/or 6-sulphate were found. Most hyaluronic acid and chondroitin 4- and/or 6-sulphate proteoglycan were extractable with 0.9% NaCl from the gallbladder wall, whereas dermatan sulphate proteoglycan was almost insoluble in 0.9% NaCl. In bile, hyaluronic acid and chondroitin 4- and/or 6-sulphate were found only in trace amounts. Two large molecular polysaccharides were isolated from the gallbladder wall and from bile. They were assumed to be the polysaccharide parts of so-called mucins. The polysaccharides were composed of glucosamine, galactosamine and galactose in the ratio of 3:1:4 or 9:1:10 and of different amounts of fucose, sialic acid and sulphate. The polysaccharides were fractionated further according to their sialic acid and sulphate content. In addition to these, large amounts of small molecular polysaccharides were isolated from the gallbladder wall and bile.

These polysaccharides consisted of varying amounts of glucosamine, galactose, glucose, mannose, fucose and sialic acids. In the gallbladder wall these polysaccharides (at the glycoprotein stage) were both soluble and insoluble in 0.9% NaCl. The "insoluble" polysaccharides were assumed to originate from structural or membrane-bound glycoproteins, e.g. plasma membrane glycoproteins.

1756 THE EFFECT OF HIGH-CARBOHYDRATE DIETS ON LIVER TRIGLYCERIDE FORMATION IN THE RAT.

(E.) Waddell, M.; Fallon, H. J. (Univ. North Carolina Sch. Med., Chapel Hill). *J. Clin. Invest.* 52(11):2725-2731, 1973.

Diets containing 75% glucose or fructose were fed to male Sprague-Dawley rats and the effect on liver triglyceride formation was studied both *in vivo* and *in vitro*. The results were compared with control rats fed laboratory chow. Both diets increased the capacity for triglyceride formation from sn-glycerol-3-P by rat liver homogenates and correspondingly increased incorporation of [1,3-^{14}C] glycerol into hepatic triglyceride by the intact animal. These independent measures of hepatic triglyceride production changed with a similar time-course characteristic for each diet. The 75% fructose diet produced a greater increase (5-10-fold) in both determinations, and reached a maximum after 11 days. Despite the increase in hepatic triglyceride formation by both diets, only the fructose diet caused consistent and sustained increase in serum triglyceride. This results probably from differences in the fractional rate of serum triglyceride removal between the 2 groups. When Triton WR-1339 inhibited serum triglyceride removal, both diets increased incorporation of [1,3-^{14}C] glycerol in serum triglyceride *in vivo* and increased serum triglyceride level above that in control rats.

1757 UREA SYNTHESIS IN LIVER SECTIONS FROM UREMIC RATS.

(Ger.) Zimmermann, E.; Selzer, H.; Hohenegger, H. (Whilhelminespital, Vienna, Austria). *Wien. Med. Wochenschr.* 123(23):365-367, 1973.

Of 22 unilaterally nephrectomized male Wistar rats, 11 underwent a second nephrectomy 3 weeks later. The rats were bled 45 hr after removal of the second kidney, their livers were removed, and liver slices were incubated in a Warburg apparatus at 37 C for 65 min with a solution containing 105 mEq/liter Na^+, 2 mEq/liter K^+, 2 mEq/liter Ca^{++}, 82 mEq/liter Cl^-, 27 mEq/liter HCO_3^-, 100 mg/100 ml glucose and 40 mg/100 ml NH_4Cl. Urea (406 mg/100 ml), creatine (6.23 mg/100 ml), and potassium (9.33 mEq/liter) concentrations and the pH (7.15) were significantly increased in the blood of uremic rats. Values for blood sodium concentrations, liver dry weight, and liver tissue water did not differ significantly between uremic rats and unilaterally nephrectomized controls. The increase in urea occurring in liver slices during incubation in the Warburg apparatus was of the same order of magnitude for both groups of animals. It is concluded that increased blood nitrogen levels did not inhibit urea synthesis in the livers of uremic rats. The large increase which occurs in blood urea levels after hemodialysis cannot be accounted for by changes in urea synthesis in the liver.

1758 ROLE OF UREA IN THE HYPERAMMONEMIA OF GERM-FREE ECK FISTULA DOGS.

(E.) Nance, F. C.; Kaufman, H. J.; Kline, D. G. (Louisiana State Univ. Sch. of Med., New Orleans, La.). *Gastroenterology* 66(1):108-112, 1974.

Hyperammonemia and symptomatic hepatic encephalopathy occur in germ-free (GF) animals after creation of an Eck fistula. The role of urea as a possible substrate for ammonia production in germ-free Eck fistula beagles was assessed in this experiment. End to side portacaval shunts were performed in GF and conventional dogs. After recovery, 40 g of urea in 200 ml of water were given by orogastric tube, and blood ammonia levels measured 3 and 6 hr postingestion, both in GF and conventional Eck fistula dogs. Conventional dogs had massive increases in blood ammonia averaging 483% after urea ingestion. GF dogs had only a minimal change averaging -6.35%. Hydrolysis of urea plays no role in the hyperammonemia of GF Eck fistula dogs, in striking contrast to conventional dogs and probably patients. The experiment provides indirect evidence that there are no endogenous ureases present in the gastrointestinal tract of the dog.

1759 INTESTINAL VERSUS HEPATIC CONTRIBUTION TO CIRCULATING TRIGLYCERIDE LEVELS.

(E.) Cenedella, R. J.; Crouthamel, W. G.; Mengoli, H. F. (West Virginia Univ. Med. Ctr., Morgantown). *Lipids* 9(1):35-42, 1974.

Using intravenous injected [2-^{3}H] glycerol, measurements were made of the kinetics of appearance and disappearance of circulating [^{3}H] labeled triglyceride in male Sprague-Dawley rats fed a fat free diet containing either no orotic acid (controls) or 2% orotic acid. Following injection of [^{3}H] glycerol, more time is required for the initial appearance of [^{3}H] triglyceride in the circulation of orotic acid treated rats than controls. The sustained entry of triglyceride into the circulation of orotic acid fed rats was only one-half times as rapid as that seen for control rats. About 10% as much [^{3}H] triglyceride entered the circulation of the orotic acid treated rats as compared with controls. However, the clearance of [^{3}H] triglyceride from the circulation of the orotic acid fed rat was only about one-half times as rapid as that of the control rat. This apparently is due to differences between the lipoproteins produced by the intestines and liver, rather than to changes in the ability of the orotic acid fed animal to clear lipoprotein-triglyceride from the circulation. Labeled lipoproteins taken from controls and injected into orotic acid treated rats were cleared from the circulation more than twice as rapidly as those taken from orotic acid fed rats and injected into controls. Considering the measured levels of plasma triglyceride synthesis and the slower turnover of the triglycerides produced by the orotic acid fed rat, the findings dicate that the intestines supply 20% or more of e total plasma triglyceride in the absence of etary fat.

60 TOWARD AN ARTIFICIAL LIVER. II. REMOVAL OF CHOLEPHILIC ANIONS FROM DOGS WITH LIARY OBSTRUCTION, BY HEMOPERFUSION THROUGH ARGED AND UNCHARGED RESINS. *(E.)* Willson, R. A.; gmann, A. F.; Kuster, G. G. R. (Mayo Clin. Mayo n., Rochester, Minn.). *Gastroenterology* 66(1): -107, 1974.

dogs with biliary obstruction, hemoperfusion rough an anion exchange resin or an uncharged sin, resin was carried out to determine whether lected protein-bound anions, normally extracted by e liver and excreted in bile, could be removed. lfobromophthalein, chenodeoxycholic acid, and tal bilirubin were continuously removed by the sins during the 2-hr perfusion period. Indocyanine een was not removed. Blood levels of chenodeoxyolic acid and bilirubin in the dogs remained latively constant, but adsorption of anions to the lumn continued throughout the perfusion, suggesting bilization of tissue stores. Bile acids were adrbed to a greater extent by the uncharged resin an by the anion exchange resin in agreement with *vitro* equilibrium binding studies. Similarly, lfobromophthalein was removed more effectively the anion exchange resin during hemoperfusion d *in vitro* studies. Hemolysis was minimal. Elecolytes remained unchanged. Serum protein concenations remained constant, but the uncharged resin sorbed some prealbumin and caused some denaturaon of ceruloplasmin. Hemoperfusion through charged uncharged resins appears to be a feasible produre for removal of protein-bound anions in an imal model designed to simulate the excretory dect present in hepatic failure, and provides an perimental method for assessing the toxicity of otein-bound metabolites.

51 UPTAKE OF MATERIALS BY THE INTACT LIVER. THE EXCHANGE OF GLUCOSE ACROSS THE CELL MBRANES. *(E.)* Goresky, C.A.; Nadeau, B.E. cGill Univ. Med. Clin., Montreal, Canada). *J. n. Invest.* 53(2):634-646, 1974.

process of entry of D-glucose into and exit from ver cells was studied with the multiple indicadilution technique. Labeled red cells (a vaslar indicator), labeled sucrose (an extracellular ference), and labeled D-glucose were rapidly incted into the portal vein, and from serially mpled hepatic venous blood, normalized outflowne patterns were obtained. The labeled red cell rve rises to an early high peak, and decays rapidand that for sucrose reaches a later and lower k and decays less rapidly, but generates an ivalent area. The curve for labeled D-glucose gins with that for labeled sucrose, gradually es to a peak which is later and substantially ver than that for sucrose, and then decreases wly. At high glucose levels this curve assumes quared-off shape, rises fairly quickly to its hest level, at the time of the sucrose peak, and then slowly decreases. Phlorizin and galactose infusion result in the emergence of a pronounced early peak, under the sucrose peak; and the curve for tracer L-glucose approaches that for sucrose. Two components are resolved from the D-glucose curves, by model analysis: throughout material, which has not entered the cells; and exchanging material, which has entered and later returned to the circulation. The analysis provides estimates of the kinetic entrance and exit coefficients; and from these, saturation of both the entrance and exit processes was evident. The characteristic transport parameters were determined. For both entrance and exit, a common *Km*, 2,170 mg/100 ml, and transport maximum, 5.13 mg s^{-1} (ml intracellular fluid)$^{-1}$, were found. Both these values are exceedingly large. Phlorizin and galactose produced competitive inhibition; the transport process was found to be relatively stereospecific; and sudden infusion of hypertonic glucose produced countertransport of labeled D-glucose.

1762 INFLUENCE OF ALBUMIN ON THE EXTRAVASCULAR DISTRIBUTION OF UNCONJUGATED BILIRUBIN. *(E.)* Bloomer, J. R.; Berk, P. D.; Vergalla, J.; Berlin, N. I. (Natl. Cancer Inst., Bethesda, Md.). *Clin. Sci. Mol. Med.* 45(4):517-526, 1973.

The influence of albumin on the extravascular distribution of unconjugated bilirubin was studied. [^{3}H]Bilirubin and ^{131}I-labelled albumin were given simultaneously to 6 healthy adults by intravenous route and the amounts in the plasma were measured for several days. Multicompartmental analysis of the data showed that the rate of movement of [^{3}H]bilirubin from the plasma into the extrahepatic extravascular space was 29.7± 7.3% of the plasma pool/hr, whereas as the rate of movement of ^{131}I-labelled albumin from plasma into the extravascular space was only 7.2 ± 1.0% of the plasma pool/hr. [^{14}C]Bilirubin was found to equilibrate throughout the body of a child with the Crigler-Najjar syndrome within 24 hr of intravenous administration, whereas ^{131}I-labelled albumin required 4-5 days in human subjects. Multicompartmental analysis of the plasma data in the 6 healthy adults indicated that the mass of material in the extrahepatic extravascular space relative to that in plasma was greater for unconjugated bilirubin than for albumin. Studies of the tissue distribution of unconjugated bilirubin in homozygous Gunn rats demonstrated that the organs which comprise the rapidly exchanging extravascular albumin pool (liver, kidney and intestine) accumulated unconjugated bilirubin in excess of their albumin content, whereas less amounts of unconjugated bilirubin were accumulated in the tissues which make up the slowly exchanging extravascular albumin pool (muscle, fat and skin). These findings indicate that unconjugated bilirubin moves more rapidly between plasma and extrahepatic extravaxcular sites than can be accounted for by transport bound to albumin. They also indicate that extravascular binding of unconjugated bilirubin includes tissue sites, as well as extravascular albumi

1763 THE RAPID CHANGES OF HEPATIC GLYCOLYTIC ENZYMES AND FRUCTOSE-1,6-DIPHOSPHATASE AC-

TIVITIES AFTER INTRAVENOUS GLUCAGON IN HUMANS.

(E.) Greene, H. L.; Taunton, O. D.; Stifel, F. B.; Herman, R. H. (Fitzsimons Army Med. Ctr., Denver, Colo.). *J. Clin. Invest.* 53(1):44-51, 1974.

Glucagon (0.04-0.09 mg/kg/min) was given intravenously for either 2 or 3 min to 8 patients with fasting-induced hypoglycemia. Liver biopsy specimens were obtained before and immediately after the glucogan infusion. The glucagon caused a significant increase in the activity of FDPase (from 50 to 72 nmol/mg protein/min) and a significant decrease in the activities of phosphofructkinase (PFK) (from 92 to 41 nmol/mg protein/min) and pyruvate kinase (PK) (from 309 to 165 nmol/mg protein/min). The glucagon infusion also caused a significant increase in hepatic cyclic AMP concentrations (from 41 to 233 nmol/mg protein). Two patients with debrancher enzyme deficiency who had biopsy specimens taken 5 min after the glucagon infusion had persistence of enzyme deficiency and cyclic AMP changes for at least 5 min. One child with glucose-6-phosphatase deficiency was given intravenous glucose (150 mg/kg/min) for a period of 5 min after the glucagon infusion and biopsy. The plasma insulin concentration increase from 8 to 152 μU/ml and blood glucose increased from 72 to 204 mg/100 ml. A third liver biopsy specimen was obtained immediately after the glucose infusion and showed that the glucagon-induced effects on PFK and FDPase were completely reversed. The glucagon infusion caused an increase in hepatic cyclic AMP concentration from 38 to 431 nmol/mg protein but the glucose infusion caused only a slight decrease in hepatic cyclic AMP concentration (431 to 384 nmol/mg protein), which did not appear to be sufficient to account for the changes in enzyme activities. Hepatic glucose-6-phosphatase and fructose-1, 6-diphosphate aldolase activities were not altered by either the glucagon or the glucose infusion in any patients. Cyclic AMP (0.05 mmol/kg) was injected into the portal vein of adult rats and caused enzyme changes similar to those seen with glucagon administration in humans. These findings suggest that rapid changes in the activities of PFK, PK, and FDPase are important in the regulation of hepatic glycolysis and gluconeogenesis, respectively, in humans and that cyclic AMP may mediate the glucagon- but probably not the glucose-insulin-induced changes in enzyme activities.

1764 RELATIVE SECRETION OF CHOLESTEROL-4-^{14}C IN THE BILE AND UPPER AND LOWER SMALL INTESTINE WASHINGS OF THE BILE FISTULA RABBIT. *(E.)*

Buchwald, H.; Gebhard, R. L.; Varco, R. L. (Univ. Minnesota Med. Sch., Minneapolis). *Surgery* 75(2): 266-273, 1974.

The secretion of circulating labeled cholesterol by a total biliary fistula, by the isolated upper half of the small intestine, and by the isolated lower half of the small intestine was measured in 21 anesthetized rabbits over an average time of 13 hr. From the secreted radioactivity, ratios were calculated and the 3 key average radioactivity excretion ratios were: bile counts per min (cpm)/combined total number of counts per min (bile counts per min + upper small intestinal counts per min + lower small intestinal counts per min 0.5470, bile counts per min/tot number of small intestinal counts per min, 1.4948; a jejunal-ileal counts per min/distal ileal counts per min, 1.6031. The measured average jejunal-ileal/dis ileal length ration was 1.338. It is concluded that the rabbit under the acute conditions of this experiment: (1) the cholesterol that is secreted in the bile is 1 1/2 times the amount secreted by the small intestinal mucosa. (2) Small bowel mucosal choleste ol secretion, on the basis of comparison of the jejunal-ileal/distal ileal counts per min and length ratios, does not appear to be localized to either th upper or the lower half of the small intestine. (3) Bowel mucosal cholesterol secretion is independent of the presence of bile salts in the intestinal lumen.

1765 PRODUCTION OF SERUM PROTEINS BY PRIMARY CULTURES OF ADULT HUMAN LIVER. *(E.)*

LeGuilly, Y.; Launois, B.; Lenoir, P.; Bourel, M. (Pontchaillou Hosp., Rennes, France). *Biomedicine* 19:248-255, 1973.

Plasma protein synthesis of adult human liver cells was studied by radioimmunoelectrophoresis of the culture medium. All determinations were made on the basis of primary cultures from explants of human adult tissue: 15 cultures of liver and 1 of aponeurosis. Eleven antihuman goat or horse antisera were used: 1 multivalent antiserum, and 10 specific antisera each precipitating one of the following human proteins: orosomucoid, α_1 antitripsin, ceruloplasmin, fibrinogen, transferrin, haemopexin, albumin, β lipoprotein, α_2 macroglobulin and haptoglobin The 10 plasma proteins tested were found in all of the 15 liver primary cultures but were never present simultaneously in the medium of a single primary culture. The evidence suggests that orosomucoid, α_1 antitrypsin, ceruloplasmin and fibrinogen are produced by epithelial cells, transferrin and hemopexin by epithelial-like cells and albumin, β lipoprotein, α_2 macroglobulin and haptoglobin by both types of cells.

1766 RELATIONSHIP OF ETHANOL TO CHOLINE METABOLISM IN THE LIVER: A REVIEW. *(E.)*

Barak, A. J.; Tuma, D. J.; Sorrell, M. F. (Univ. Nebraska Med. Ctr., Omaha). *Am. J. Clin. Nutr.* 26(11):1234-1241, 1973.

Despite the fact that ethanol ingestion and choline deficiency appear to have related effects on the liver, a true relation of ethanol metabolism to choline metabolism in this organ has not been shown. A technique for the quantitative measurement of choline uptake by the isolated perfused liver has been developed and has served as a convenient model for studies involving hepatic ethanol-choline relations. These studies have shown that a specific choline oxidase antagonist, 2-amino-2-methyl-1-propanol, and 2 nonspecific choline oxidase inhibitors depressed hepatic choline uptake. This indicates that the uptake is primarily a function of the choline oxidative pathway. Circulation of ethanol in liver perfusates or chronically feeding ethanol to rats

nhanced choline uptake. Pyrazole inhibition of
his ethanol-induced increase suggests that ethanol
ust be metabolized to produce its effect. Inves-
igation of the effects of 2 metabolic products of
thanol, acetate and NADH, demonstrated that in-
reased NADH generation due to hepatic ethanol me-
abolism may cause the observed increase in choline
tilization. The ability of the choline oxidase
nhibitor to block the effect of ethanol suggests
hat the increased choline requirement due to alco-
ol may result from ethanol metabolism stimulating
he oxidative degradation of choline in the liver.
hese results suggest a direct metabolic relation
etween ethanol administration and choline metabol-
sm, which may have an effect on lipid transport or
he pathogenesis of the alcoholic fatty liver.

767 DEHYDROCHOLATE METABOLISM AND THE EFFECT
OF DEHYDROCHOLATE ON BILIARY SECRETION IN
HE DOG. *(Fr.)* Desjeux, J. F.; Erlinger, S.; Du-
ont, M. (Beaujon Hosp., Clichy, France). *Biol.*
astroenterol. (Paris) 6(1):9-18, 1973.

quimolar solutions of sodium taurocholate or sodium
ehydrocholate (22.5-75 μM/ml) were infused i.v. in-
o 8 anesthetized dogs and 1 unanesthetized dog
ith a Thomas duodenal cannula. Rates of infusion
anged from 22.5-75 μM/min for 50-105 min. Total
ile salts were determined with 3α-hydroxysteroid
ehydrogenase, and bile acids were separated by
hin-layer chromatography. Bile was fractionated
ultracentrifugation in a cesium chloride solution.
ile output averaged 40% higher during dehydrocho-
ate than during taurocholate infusion. A signi-
icant correlation was found between the amount of
ehydrocholate infused and the excretion of bile
alts hydroxylated in the 3α position. About 50%
the dehydrocholate administered was converted in-
3α-hydroxylated derivatives in the bile. No un-
hanged dehydrocholate was isolated from the bile
uring dehydrocholate infusion; 2 unidentified meta-
olites were isolated by thin-layer chromatography.
liary excretion of both phospholipids and choles-
erol were significantly lower with dehydrocholate
han with taurocholate infusion. The results of
tracentrifugation of bile secreted during dehydro-
olate infusion are compatible with the presence
a macromolecular complex containing dehydrocholate
tabolites and bile pigments but not phospholipids
cholesterol. In the dog it is concluded that
hydroxylated metabolites excreted into the bile
ring dehydrocholate infusion are apparently able
form macromolecular aggregates or micelles but
not enhance phospholipid and cholesterol excre-
on. The increase in bile output caused by dehydro-
olate infusion may result from the specific action
dehydrocholate metabolites on electrolyte and wa-
r secretion by the hepatocytes rather than from
e appearance of dehydrocholate in the bile.

68 FATTY LIVER AND CIRRHOSIS IN LIPOTROPE-
DEFICIENT MALE RATS. *(E.)* Rogers, A. E.;
wberne, P. M.; (Dept. Nutr., Massachusetts Inst.
ch., Cambridge). *Am. J. Pathol.* 73(3):817-820,
73.

Rats (Charles River CD strain, Wistar, and Fischer) were fed from weaning a diet deficient in choline, methionine, vitamin B_{12} and folic acid, high in fat and adequate in amino acid content other than methionine. Such a diet induced defective lipid and drug metabolism, fatty liver of increasing severity, depression of serum lipids and increased hepatocyte turnover over a 6-month period followed by fibrosis and cirrhosis at 6-12 months. The severity of deficiency and rapidity with which fatty liver and cirrhosis develop are governed by dietary levels of the nutrients listed above and by the rat's age. Marginal lipotrope deficiency may also be produced which induces fatty liver but not cirrhosis and is useful in long-term studies of chemical toxicity and carcinogenicity for it supports nearly normal growth and longevity while inducing the biochemical abnormalities found in severe deficiency. The fatty liver and cirrhosis induced in rats closely resemble the human disease in gross and microscopic lesions and development of hepatic dysfunction. There is an exception in the case of alcoholic hepatitis and its associated hyaline cytoplasmic deposits which may require exposure to alcohol or other hepatotoxins. The sensitivity of cirrhotic patients to environmental carcinogens as suggested by their high incidence of esophageal and hepatic cancer is being investigated. Aflatoxin B1 and diethylnitrosamine are more effective hepatic carcinogens in lipotrope-deficient rats than in normal rats, an effect which may be mediated through impairment of drug metabolism in the endoplasmic reticulum.

1769 STUDY ON THE MECHANISM OF INDUCTION OF ALKALINE PHOSPHATASE ACTIVITY IN RAT LIVER AFTER BILE FLOW OBSTRUCTION. *(E.)* Ferwerda, W.; Stepan, J. (Dept. Chem. Physiol., Vrije Univ., Amsterdam, Netherlands). *Hoppe Seylers Z. Physiol. Chem.* 354(10/11):1462-1472, 1973.

The inducible liver alkaline phosphatase from adult male Wistar rats with extrahepatic cholestasis and from controls was purified by butanol extraction, Sephadex G-200 filtration, Sepharose 6B filtration in the presence of an ionic detergent, and, as the final step, preparative polyacrylamide gel electrophoresis. The enzyme from cholestatic rats was purified more than 1000-fold. The specific enzyme activity increased from 3.2 to 3296 units/mg. For sham-operated rats the purification was nearly the same, the specific enzymic activity increasing from 1.0 to 1146 units/mg. The preparations were of a high degree of purity as shown by analytical polyacrylamide gel electrophoresis. A double band of activity was found in the case of cholestasis, but a single one was obtained after sham-operation. No significant alteration of incorporation of ^{14}C-labelled amino acids and $[^{14}C]$glucoseamine into the purified inducible alkaline phosphatase of cholestatic rats was found. During the first hours after obstruction, the incorporation of ^{14}C-labelled amino acids into total liver protein was about 20% less in cholestatic rat liver than in the livers of sham-operated rats. The finding that alkaline phosphatase in the cholestatic rat liver is 3 times more active than in the control liver indicates that a more active enzyme molecule is formed during cholestasis. No evidence was uncovered to suggest that either an increased rate of alkaline phosphatase synthesis or a decreased rate of catabolism of the enzyme occurred after cholestasis.

1770 THE CHOLERETIC EFFECTS IN DOGS OF THE SYNTHETIC C-TERMINAL OCTAPEPTIDE OF CHOLECYSTOKININ AND OF TWO PEPTIDE MIXTURES, G1 AND G2, DERIVED FROM UPPER HOG INTESTINE. *(E.)* Thulin, L. (Karolinska Inst., Stockholm, Sweden). *Acta Chir. Scand.* 139(7):641-644, 1973.

The hepatic bile flow was studied in 5 dogs with permanent external common duct fistulas during i.v. infusions of synthetic octapeptide of cholecystokinin and 2 polypeptide mixtures, denoted G1 and G2, extracted from upper hog intestinal mucosa as late side fractions during the preparation of secretin. Infusions of 90-120 min were given to animals which had fasted for 16-22 hr. Pre-infusion bile flow values were used as controls. Synthetic C-terminal octapeptide of cholecystokinin (1-80 Ivy dog units/kg/hr) was administered in 19 experiments in 3 dogs. The bile flow increased to an average of 200% of control at 5 units/kg/hr. No further response was obtained with higher doses. Polypeptide mixture G1 (5-100 μg/kg/hr) was administered in 11 experiments in 3 dogs. The bile flow increased to 350-400% of control at doses of 50-100 μg/kg/hr. Maximum response was probably not obtained. Polypeptide mixture G2 (5-100 μg/kg/hr) was administered in 15 experiments in 4 dogs. The bile flow increased to about 275% of control at doses of 40-50 μg/kg/hr with no further increase at higher dosages. The results indicate that the choleretic activity of cholecystokinin is similar to that of the natural hormone and that G1 and G2 must be included in the group of polypeptides having choleretic activity.

1771 PROTECTIVE INFLUENCE OF DIPHENYL-p-PHENYLENEDIAMINE ON HYDRAZINE INDUCED LIPID PEROXIDATION AND HEPATIC INJURY. *(E.)* Di Luzio, N. R.; Stege, T. E.; Hoffman, E. O. (Tulane Univ. Sch. Med., New Orleans, La.). *Exp. Mol. Pathol.* 19(3):284-292, 1973.

The influence of diphenyl-p-phenylenediamine on hydrazine-induced hepatic toxicity was assessed so that its ability to modify chemically induced hepatic injury might be evaluated. The administration of hydrazine (4 mg/100 g) to female Sprague-Dawley rats caused a 7-fold increase in liver triglyceride concentration. A 60% inhibition of triglyceride accumulation occurred in the diphenyl-p-phenylenediamine-treated group. Hydrazine also increased hepatic lipid peroxidation as reflected by malonaldehyde formation. The increase in malonaldehyde formation was prevented by diphenyl-p-phenylenediamine treatment. In contrast to profound hepatic necrosis observed following hydrazine, livers from diphenyl-p-phenylenediamine treated rats which received hydrazine showed only mild architectural alterations. The hypoglycemia and retention of BSP which developed upon hydrazine administration were not modified by diphenyl-p-phenylenediamine. The ability of the lipid soluble antioxidant, diphenyl-p-phenylenediamine, to significantly inhibit hydrazine-induced fatt infiltration, necrosis, and lipid peroxidation further accents the potential of employment of appropriate antioxidants in the prevention of chemically-induced hepatic injury.

1772 SOLUBILIZATION AND CHARACTERIZATION OF HEPATIC BILIRUBIN UDP-GLUCURONYLTRANSFERASE *(E.)* Gregory, II, D. H.; Strickland, R. D. (Albuquerque VA Hosp., N.M.). *Biochim. Biophys. Acta* 327:36-45, 1973.

The hepatic enzyme, bilirubin UDPglucuronyltransferase has been solubilized in stable form by treating rat liver microsomes with 10% (by weight) dissolved digitonin at pH 7.8. All enzyme activity was associated with the rough membranes of the endoplasmic reticulum as shown by ultracentrifugation of selected density gradients in combination with electron microscopy. Proof of solubilization was determined by analytic ultracentrifugation, gel filtration, and electron microscopy which indicated that the enzyme was an homogeneous protein with a calculated molecular weight in the range of 150,000. From the homogeneous Schlieren pattern obtained by analytical ultracentrifugation, the sedimentation coefficient of the major component was estimated to be 6.9 S. The assay characteristics of soluble transferase differ in several ways from those observed in homogenates. The pH optimum for soluble enzyme was 7.8. Magnesium ion, essential for enzyme activity, could vary in concentration from 5-20 mM without affecting results. Exposure to temperatures in excess of 45°C for 3 min reduced enzyme activity by 80%. Solubilized preparations were stable for at least 7 days when stored at 4 C. Now that a stable and soluble preparation of hepatic glucuronyl transferase is available, studies concerning substrate specificity can proceed.

1773 INFLUENCE OF HYDROCORTISONE ON BILE FORMATION IN THE RAT. *(E.)* Dumont, M.; Erlinger, S. (Beaujon Hosp., Clichy, France). *Biol. Gastroenterol. (Paris)* 6(3):197-203, 1973.

The effect of hydrocortisone on bile flow, bile acid excretion, erythritol and sucrose clearance, and sodium excretion into bile has been studied. The influence and possible mode of action of this hormone on bile formation in the male Sprague-Dawley rat was thus investigated. Several observations were apparent during hydrocortisone infusions. The flow of bile increased. This effect was dose-dependent, a maximal increase of approximately 75 p. 100 for a dose of 2 mg/min/100 g. Bile acid excretion was not modified. Erythritol clearance increased in parallel to bile flow, suggesting that the increased flow was of canalicular (hepatocytic) rather than ductal or ductular origin. Sucrose clearance was not significantly different during hydrocortisone choleresis and during a taurocholate induced choleresis of similar magnitude. This finding supports the view that hydrocortisone did not modify the permeability of the canalicular membrane to this solute, and, presumably, to water and ele-

rolytes. Sodium excretion increased. These obser-
ations suggest that hydrocortisone stimulates the
ile acid independent fraction of canalicular bile
low in the rat.

'74 USE OF HEPATIC CELL MEMBRANE POTENTIAL MEASUREMENT TO EVALUATE METHOD OF LIVER
RESERVATION. *(E.)* Lambotte, L. (Lab. Exp. Surg.,
niv. Louvain, Belgium). *Surgery* 74(4):509-518,
)73.

method of evaluating liver viability based on
easurement of hepatic cell membrane potential with
croelectrodes was used to assess the protection
ven by various drugs during liver anoxia at reduced
mperature. Isolated canine livers were perfused
th blood at 20 C for 2 hr, submitted to a circu-
tory arrest of 2 hr, and reperfused for 2 hr to
serve the fall of membrane potential produced by
oxia and its subsequent recovery. Pretreatment
th Tham (0.3 M), chlorpromazine (50 mg), and
thylprednisolone (125 mg) did not modify the course
the membrane potential during the second period
perfusion. In contrast, addition of isoproterenol
rkedly improved the recovery of the membrane poten-
al. A favorable effect of isoproterenol was also
served when the liver was rinsed with Ringer's
ctate solution and kept 3 hr at 5 C or kept anoxic
20 C 3 hr before the second perfusion. Isopro-
renol was also of some benefit when given after
2 hr circulatory arrest but not after a 4 hr cir-
latory arrest. Isoproterenol thus protects the
ver during anoxia and improves the recovery of a
derately damaged liver. This effect is related
a reduction of membrane permeability to sodium,
sulting in decreased accumulation of sodium in-
acellularly and decreased energy expenditure by
e sodium pump. Confirmation of these results was
tained in liver transplantation.

75 ACQUISITION OF AN EMBRYONAL BIOCHEMICAL FEATURE IN THE RAT LIVER AFTER PORTACAVAL
JNT. *(E.)* Colombo, J. P.; Bircher, J. (Hosp.
rne, Bern, Switzerland). *Experientia*
(10):1232-1233, 1973.

patic γ-glutamyl transpeptidase was measured in
ult male Sprague-Dawley rats 10, 20, and 30 days
ter an end-to-side portacaval shunt to determine
ether some of the hepatic consequences of a porta-
val shunt might be a regression of the hepatocytes
a more immature or embryonal state. It is known
at this enzyme is 10 to 20 times more active in
e newborn than in the adult rat. After 10 days
e glutamyl transpeptidase activity had increased
-fold and remained at this level throughout the
riod of observation. The high enzyme activity in
rtain rat hepatomas which contain glycogen, pro-
ce bile, and have a high level of glucose-6-
osphatase suggests that glutamyl transpeptidase
be activated in parenchymatous liver cells during
e carcinogenic process. The generally recognized
or morphological alterations occurring in the
ver of shunted rats are not sufficient to explain
s 10-fold increase in enzyme activity. Whether
s reversion to a biochemical feature predominant
in the fetus is limited to a few specific enzymes or represents a form of generalized hepatic immaturity after portacaval shunts is not certain at this point.

1776 BIOSYNTHESIS OF LIPIDS FROM U-^{14}C GLUCOSE BY THE ISOLATED LIVER PERFUSED IN HYPOXIA. *(E.)* Soler-Argilaga, C.; Infante, R.; Polonovski, J. (Fac. Med. Saint Antoine, Paris, France). *Biomedicine* 19(9):399-402, 1973.

The effects of hypoxia on glucose metabolism and the synthesis of liver lipids were investigated in male Wistar rats. Hypoxia caused a reduction in the hepatic glycogen level and a rise in glycemia during the perfusion, most significant in livers from fed rats perfused in hyperglycemia. Hypoxia did not significantly modify glucose utilization, but increased its production, particularly in the fed rat livers having higher glycogen levels. When perfused in hypoxia, the amount of circulating glucose transformed into lipid glycerol was slightly increased, but no significant difference in the incorporation of 14-C into the fatty acids was observed. These results show that hypoxia increased hepatic production of glucose without modifying its utilization and brought about a reduction of specific activity of glucose following the anaerobic glycolytic pathway. Consequently, the slight increase in incorporation of circulating glucose in glyceride and phosphoglyceride glycerol found after oxygen reduction is partly due to overproduction of lipid glycerol from glucose under these conditions. Overproduction of lipid glycerol is assumed to result from increased synthesis of L-α-glycerophosphate.

1777 STUDY OF ALBUMIN SYNTHESIS IN RELATION TO UREA SYNTHESIS. *(E.)* Oratz, M.; Schreiber, S. S.; Rothschild, M. A. (New York VA Hosp., N.Y.). *Gastroenterology* 65(4):647-650, 1973.

Albumin synthesis in the isolated perfused rabbit liver was simultaneously measured immunologically by the ^{14}C-carbon dioxide method. Since this ^{14}C method requires the assay of synthesized urea carbon-specific activity, urea synthesis was varied by dietary alterations and by perfusion with alcohol (200 mg/100 ml), tryptophan (10 mM), arginine (10 mM), and ornithine (10 mM). Albumin synthesis rates, determined by the 2 methods agreed well over a 10-fold range of albumin and urea synthesis rates. Perfusion with arginine or ornithine increased albumin synthesis 3-fold compared with fasted control values. These data suggest that, kinetically, arginine acts as a single precursor pool for albumin and urea synthesis, and support the validity of the ^{14}C-carbon dioxide method *in vitro*.

1778 DRUG HYDROXYLATION AND GLUCURONIDATION IN LIVER MICROSOMES OF PHENOBARBITAL-TREATED RATS. *(E.)* Vainio, H. (Dept. Physiol., Univ. Turku, Finland). *Xenobiotica* 3(11):715-725, 1973.

The environmental requirements of the UDP-glucuronyltransferase and the mixed function oxidase in hepatic

... microsomes were studied in 64 adult male Wistar rats. The rise in *p*-nitroanisole *O*-demethylase activity in liver microsomes after phenobarbital treatment of rats slightly preceded, and was greater than, the increase in hepatic microsomal UDP-glucuronyltransferase activity. Predigestion of hepatic microsomes with trypsin was necessary in order to detect the increase in UDP-glucuronyltransferase activity. Digitonin was not able to reveal the increase induced by phenobarbital. Trypsin digestion of hepatic microsomes solubilized about 30% of the proteins in control rats and 45% in microsomes isolated from phenobarbital treated rats. The amount of solubilized phospholipids was only about 6% in both cases. The proteins solubilized by trypsin contained some components of the mixed-function oxidase including all of the NADPH cytochrome *c* reductase and a part of the cytochrome P-450 (as cytochrome P-420). The trypsin digestion appears to peel off the superficial proteins of the microsomal vesicle and to uncover UDP-glucuronyltransferase from the deep layers of the microsomal membrane.

1779 DISPLACEMENT OF ALBUMIN-BOUND BILIRUBIN BY INJECTABLE DIAZEPAM PREPARATIONS IN VITRO.

(E.) Bratlid, D.; Langslet, A. (Rikshosp., Oslo, Norway). *Acta Paediatr. Scand.* 62(5):510-512, 1973.

The injectable diazepam preparations, Valium, Stesolid, and Vival were tested for their ability to displace bilirubin from albumin *in vitro*. Valium and Stesolid caused marked displacement of bilirubin and this effect was potentiated by a reduction in pH. Both these diazepam preparations contain benzoate in the buffer preservative. Vival, which does not contain benzoate in the buffer preservative, did not show any displacement at pH 7.4 and had only a slight effect at pH 6.8. The ability of benzoate as a potent displacer of bilirubin from albumin must suggest the possibility of untoward effects of Valium and Stesolid in the neonate with hyperbilirubinemia and the tendency to acidosis. It is suggested, therefore, that, in neonatal medicine, preparations not containing benzoate should be preferred for parenteral administration in cases where exact knowledge of the serum levels of benzoate after administration is not available.

1780 EFFECTS OF SPIRONOLACTONE ON CARBON TETRACHLORIDE HEPATOTOXICITY.

(E.) Carlson, G. P.; Fuller, G. C.; Fausto, N. (Coll. Pharm., Univ. Rhode Island, Kingston). *Proc. Soc. Exp. Biol. Med.* 145(1):182-185, 1974.

Pretreatment of male albino Charles River rats with spironolactone resulted in protection against CCl_4 hepatotoxicity. This protection was evidence by decreased reduction of liver glucose-6-phosphatase activity, smaller rises in SGOT and SGPT, and less severe hepatic damage as observed by histological examination. Spironolactone pretreatment and spironolactone *in vitro* both decreased lipid peroxidation due to CCl_4 as measured by malonaldehyde formation. The data substantiate the results previously reported by others that pretreatment with spironolactone of male rats results in increased cytochrome c reductase activity but no alteration in P-450 content.

1781 X-IRRADIATION AND BILIARY SECRETION IN THE RAT.

(Fr.) Deby, C.; Dupont, G.; Neuray, J.; Jeuniaux, F. (Lab. Radiobiol., Univ. Liege, Belgium). *Arch. Int. Physiol. Biochim.* 81(3):542-544, 1973.

To determine what causes an increase in fecal lipid excretion after lethal irradiation, bile secretion was investigated in fasting 8-month-old rats under pentobarbital sodium and hyosciamine anesthesia after irradiation with 1000 r. Bile output was measured in 47 males (18 controls and 29 irradiated rats) and 42 females (15 controls and 27 irradiated rats). Bile output increased in both males and females 24 and 48 hr after lethal irradiation. Lipid outputs, measured in 12 controls and 17 irradiated males, were 5.4 ± 0.43 mg/hr in controls, 13 ± 1.48 mg/hr 24 hr after irradiation, and 17.4 ± 1.66 mg/hr 48 hr after irradiation. The output of aliphatic fatty acids was 191% of control values 24 hr after irradiation and 239% of control values 48 hr after irradiation.

1782 BIOCHEMICAL STUDY OF THE DECREASED HEPATOTOXICITY OF CARBON TETRACHLORIDE AFTER LOADING THE RETICULOENDOTHELIAL SYSTEM OF THE RAT WITH CARBON PARTICLES.

(Fr.) Reynier, M.; Sireix, R.; Leterrier, F.; Mariaud, J. F. (Inst. Physicochem. Biol., Paris, France). *J. Pharmacol. (Paris)* 4(2):181-188, 1973.

Injection of 2 doses of India ink (8.6-86.5 mg/kg i.v. each) on the 2 days prior to administration of a toxic dose of carbon tetrachloride (0.75-1.25 ml/kg p.o. through a stomach tube) to male Charles River rats inhibited increases in SGPT and hepatic calcium. Two doses of 43.2 mg/kg carbon each had no appreciable effect on the decrease in glucose-6-phosphatase activity or on the relative weight of the liver. This dose of carbon significantly increased the sleeping time induced by hexobarbital (80 mg/kg i.p.) 24 hr after the last injection of carbon particles and significantly reduced the cytochrome P-450 content of the liver and the rate of ethylmorphine demethylation *in vitro* by liver microsomes. These findings suggest that carbon loading reduces the hepatotoxicity of carbon tetrachloride by reducing toxic free radical ($CCl_3^{\bullet}$) formation catalyzed by microsomal enzymes which are dependent upon cytochrome P-450.

1783 EFFECT OF ALCOHOL ON ALBUMIN SYNTHESIS BY THE ISOLATED PERFUSED RAT LIVER.

(E.) Kirsch, R. E.; Frith, L. O.; Stead, R. H.; Saunders, S. J. (Dept. Med., Univ. Cape Town, South Africa). *Am. J. Clin. Nutr.* 26(11):1191-1194, 1973.

Albumin synthesis by the isolated perfused liver of male albino Wistar rats was measured by the (^{14}C) carbonate method using perfusates of whole rat blood with and without the addition of 400 mg/100 ml alcohol. Alcohol significantly reduced albumin synthe-

ı. The addition of a mixture of 11 essential
.no acids to 10 times their normal plasma concen-
ıtions restored albumin synthesis to normal in
presence of 400 mg alcohol. Omission of trypto-
ın from the amino acid mixture did not affect
ability of amino acids to restore albumin synthe-
to normal. Methylene blue corrected the NAD/NADH
:io which had been distorted due to alcohol, but
not reverse the effects of alcohol on albumin
ıthesis. These results suggest that the disordered
/NADH ratio does not play an important role in
depression of albumin synthesis due to alcohol.

34 EARLY ULTRASTRUCTURAL CHANGES OCCURRING
IN HEPATOCYTE NUCLEI IN MICE DURING ACUTE
ENERATIVE HEPATITIS INDUCED BY FV$_3$ (FROG VIRUS 3).
.) Bingen, A.; Kirn, A. (Fac. Med., Louis Pas-
r Univ., Strasbourg, France). *J. Ultrastruct.*
. 45(5/6):343-355, 1973.

ra-thin liver slices from inbred IC mice were
mined under the electron microscope during the
st 5 hr after i.p. injection of 5 x 10^8 focus-
ming U of frog virus 3 (FV3). Lesions, which
an to appear after 1 hr, included changes in the
pe of the nuclei, an increase in perinucleolar
omatin, and an increase in the number of peri-
omatin granules. In the nucleoplasm there was
increase in the number of interchromatin granules,
ch were found in dense clusters, and fibrillar
dles appeared. Typical nucleolar segration was
ely observed. After 5 hr no changes had occurred
the cytoplasm. These results show that FV3
ses very early, pronounced changes in the nuclei
hepatocytes. Since it was previously found that
also produces very early, pronounced inhibi-
n of RNA synthesis, it is suggested that the
rastructural changes occurring in the nuclei
hepatocytes are the result of metabolic disorders.
se metabolic disorders are probably caused by
action of toxic proteins which make up recently
ubilized virus. FV3 is the first known example
a virus which induces very early, pronounced
nges in the hepatocytes in the absence of repli-
ion.

5 MITOCHONDRIAL FUNCTIONS IN AN ETHANOL-
INDUCED FATTY LIVER. *(E.)* Gordon, E. R.
ntreal Gen. Hosp., Canada). *J. Biol. Chem.*
(23):8271-8280, 1973.

ked alterations in the functions of hepatic mito-
ndria were observed in male Sprague-Dawley rats
a nutritionally adequate diet having 36% of its
oric content supplied by ethanol. A direct
sal relation exists between changes in mito-
ndrial function and abnormal accumulation of
ld in the liver. When ethanol forms a signifi-
t part of the diet, the reducing equivalents re-
red for the respiratory chain arise mainly from
lation of ethanol rather than β oxidation of
ty acids. Thus it would appear that a change
the major source of extra-mitochondrial NADH
luced a shift in fatty acid metabolism which
ms to be the basis for the biochemical change
lucing the observed alterations in mitochondrial
function. A significant increase in the hepatic level of long chain acyl coenzyme A derivatives of fatty acids was observed and it is suggested that this abnormal accumulation of these derivatives inhibited the translocation of ADP across the mitochondrial membrane. This explains the lowering of the respiratory activity and lack of respiratory control which has been observed in the mitochondria isolated from an ethanol-induced fatty liver. This transition from State 3 to 4 in the mitochondria explains the observed decrease in the flux of substrate through the tricarboxylic acid cycle, the shift in the oxidation-reduction state of the mitochondria to a more reduced level, and the decreased synthesis of ATP in the liver of these animals exhibiting a fatty liver.

1786 REGENERATION AND METABOLIC CHANGES FOLLOWING EXTENSIVE LIVER RESECTION IN DOGS. *(E.)* Flatmark, A.; Ro, J. S.; Jakobsen, Jr., A.; Enge, I.; Skrede, S. (Inst. Surg. Res., Oslo, Norway). *Scand. J. Gastroenterol.* 8(7):609-613, 1973.

Resection of 76% of the liver on an average or sham operation was performed in dogs. A midline abdominal incision was performed and the hepatic vessels were dissected out. All liver tissue, except the right lateral and caudate lobes, were removed after ligation of the appropriate afferent vessels and bile ducts. The corresponding liver veins were closed with continuous suture. The gallbladder was emptied and the resected specimen weighed. The amount of resected liver tissue in percent was then calculated. The extent of liver resection varied between 63 and 87%. Weekly blood samples were taken for metabolic studies. The 12 dogs which were killed 2 weeks or more after resection had regenerating livers which exceeded the calculated preoperative weights. Following liver resection, the total protein level in serum had increased even after 1 week, and the highest value, 7.1 g/dl, was found after 3 weeks. Albumin concentration was moderately reduced from 2.7 to 2.5 g/dl during the first 2 weeks. Albumin synthesis was therefore not seriously compromised in dogs if 3/4 of the liver were removed. The alkaline phosphatase level rose to a high of 544 U/l, while bilirubin alterations were small, probably owing to a clinically unimportant obstruction of small bile ducts. This technique probably minimizes the leakage of albumin from the liver surface.

1787 EFFECT OF ALBUMIN CONCENTRATION AND COLLOID OSMOTIC PRESSURE ON ALBUMIN SYNTHESIS IN THE PERFUSED RAT LIVER. *(E.)* Dich, J.; Hansen, S. E.; Thieden, H. I. D. (Dept. Biochem., Univ. Copenhagen, Denmark). *Acta Physiol. Scand.* 89(3): 352-358, 1973.

The effect of the albumin concentration and the colloid osmotic pressure on the rate of albumin synthesis was investigated in the perfused liver from female Wistar rats. A change in the albumin concentration from 60 mg/ml to 45 mg/ml, which resulted in a concomitant decrease in the colloid osmotic pressure, enhanced the rate of albumin synthesis by

60% from 1.4 to 2.2 mg/hr/100 g rat. A further decrease in albumin concentration to 25 mg/ml decreased the rate of synthesis to 1.8 mg/hr. A decrease in the protein concentration from 72 to 36 mg/ml increased the rate of albumin synthesis by 38%, from 1.4 to 2.0 mg/hr. Further reduction of 18 mg/ml caused a total increase in the rate of albumin synthesis of 86%. Simultaneously the colloid osmotic pressure decreased from 30.9 to 5.1 cm water. Addition of bovine gammaglobulin (72 mg/ml) to diluted plasma increased the protein concentration from 37 to 108 mg/ml and from 18 to 90 mg/ml. Colloid osmotic pressure increased simultaneously to 29.0 and 16.1 cm water, resp. This resulted in a decrease in the rate of albumin synthesis by 30% and 19%, resp. It is concluded that the rate of albumin synthesis may be regulated by the colloid osmotic pressure. The albumin concentration seems significant in such regulation only through its contribution to the colloid osmotic pressure.

1788 BILE SALTS: A DETERMINANT OF THE BILE-PERITONEAL ELECTRICAL POTENTIAL DIFFERENCE IN THE RAT. *(E.)* Binder, H. J.; Boyer, J. L. (Yale Univ. Sch. Med., New Haven, Conn.). *Gastroenterology* 65(6):943-948, 1973.

The electrical potential difference between bile and peritoneal cavity of male Sprague-Dawley rats was determined to study the mechanism of bile formation. A significant negative (-4.4 mv) was measured in the basal state at a time when the rat was secreting normal amounts of bile salts. The i.v. administration of sodium dehydrocholate produced a significant increase in negative potential difference, bile salt concentration (from 26.6 to 43.5 n moles/min), bile salt output (from 48.8 to 213.5 n moles/min/g liver), and bile flow (from 1.80 to 4.97 liters/min/g liver). When non-bile salt dependent canalicular secretion was studied by creating a biliary fistula, there was a marked fall in potential difference, bile salt concentration, and bile salt output, but only a modest decrease in bile flow. The changes observed in electrical potential difference correlated best with changes in bile salt concentration. The potential difference fell toward zero when non-bile salt dependent canalicular secretion was predominant. If the measured potential difference reflects canalicular events, non-bile salt dependent canalicular secretion may be associated with zero potential difference in the rat. The zero potential difference suggests that this fraction of canalicular secretion may be linked to a neutral cation-anion pump.

1789 EFFECT OF TAURINE ON THE CAPACITY OF THE BILE TO SOLUBILIZE CHOLESTEROL IN LITHOGENIC HAMSTERS. *(E.)* Fujihira, E.; Ohshima, T.; Ushioda, I.; Furuhashi, T.; Takahashi, N.; Sasajima, M.; Tanaka, I. (Taisho Pharmaceutical Col., Ltd., Tokyo, Japan). *Chem. Pharm. Bull.* 21(12):2796-2798, 1973.

The effect of administered taurine on gallstone formation and cholesterol solubility in bile was studied in lithogenic male golden hamsters. They were divided into 4 groups of 7 animals each and given subcutaneously taurine in the daily doses of 0, 250, 500, and 1000 mg/kg, respectively, during the entire experiment. Seven hamsters of the same lot were given free access to a commercial diet. Retardation of growth was observed in the animals fed the test lithogenic diet and daily administrations of taurine were without effect. Taurine treatment had no effect on the frequency of gallstone formation. Nevertheless, dark green-brown stones of irregular shape were developed mostly in the highly dosed groups, while white or yellow stones were characteristic in the animals treated at 250 mg/kg and the untreated. Lithogenic hamsters demonstrated a marked decrease in the biliary secretion of total bile acids, especially of cholic acid as compared to normal controls. In the taurine-treated groups of lithogenic animals, however, the reduction of bile acid secretion was to a lesser extent as the doses were increased. Organic phosphorous was also reduced markedly in the bile of lithogenic hamsters, while the biliary secretion of cholesterol increased about two times larger than the normal level. Following the administration of taurine, the reduced secretion of organic phosphorous increased slightly, while the level of cholesterol remained unchanged. Taurine treatment had no effect on the concentrations of serum cholesterol, phospholipids, and triglycerides in lithogenic animals. It is concluded that taurine treatment was ineffective in protecting animals from gallstone formation.

1790 LIVER ARTERIALIZATION WITH PORTACAVAL SHUNT IN THE CIRRHOTIC RAT. *(E.)* Lecompte, Y.; Franco, D.; Martin, E. D.; Bismuth, H. (Paul Brousse Hosp., Villejuif, France). *Surgery* 75(2):161-168, 1974.

Hepatic cirrhosis was induced in 29 male Charles River rats by carbon tetrachloride (0.1 ml, s.c.) given twice weekly for 8 months. End-to-side portacaval shunts were performed on 10 rats while 19 others had portacaval shunts plus arterialization of the hepatic stump of the portal vein with the use of the right renal artery. The mortality rate within 24 hr of operation in the arterialized group was 57%; in the shunted group, 33%. There was a steady weight loss in both groups. SGPT increased to 313 mU/ml on the second day in shunted animals and thereafter returned to preoperative values within a week. SGPT did not rise in arterialized animals. The BSP disappearance rate decreased to 0.084 in the shunted rats on the 7th postoperative day, compared to the preoperative value of 0.123. Similar results were obtained in the arterialized animals, though the decline in disappearance rate was much slower. The hepatic structure in shunted animals remained unchanged from its cirrhotic state even 6 weeks after shunting. In arterialized rats, however, changes including increases in portal fibrosis, spotty necrosis, polymorphonuclear infiltration of the portal tracts, and dilation of the intrahepatic portal branches with a thickening of their walls were noted even after 2 weeks. It is suggested that, in cirrhotic patients following portacaval shunting, the disappearance of portal blood is not compensated by a spontaneous increase in liver

rterial blood flow, thus arterialization may be
seful in overcoming the early postoperative risk
f liver failure. However, liver damage as seen
n this study may be due to the high rate flow
nd/or the high pressure created within the portal
ystem by the arterioportal anastomosis, and would
orce consideration of arterialization as only a
emporary procedure.

791 INFLUENCE OF ARGININE OR ORNITHINE UPON ETHANOL EFFECTS ON RAT LIVER METABOLISM.

E.) Griffaton, G.; Rozen, R.; Naon, R.; Lowy, R.
Hosp. Bichat, Paris, France). *Enzyme* 14(6):325-
39, 1972/73.

oung Wistar male rats (120-130 g) were fasted over-
ight and given either 3 g ethanol/kg body weight,
5 g/kg arginine, 1.14 g/kg ornithine, or the asso-
iation of ethanol and arginine, or ethanol and or-
ithine by the i.p. method. The animals were killed
: 0 (controls), 20, 40, and 60 min after the injec-
ion. The time course of 13 compounds was followed
n their liver. After arginine or ornithine adminis-
ration, glutamate, aspartate, alanine, malate, cit-
ate, and urea increased, while the ketone bodies,
-hydroxybutyrate, and acetoacetate decreased. The
oncentrations of α-oxoglutarate, pyruvate, and
aloacetate did not change. The changes produced
ethanol were those presented in previous papers,
t there were interactions when ethanol was given
gether with arginine or ornithine: they chiefly
ncerned alanine, citrate, and acetoacetate in the
nithine experiment, aspartate, glutamate, gluta-
ne, and urea in the arginine one. Arginine or
nithine promote a strong influx of metabolites from
utamate to malate, aspartate, and alanine. This
obably decreases citrate synthesis from ethanol
d overcomes ethanol effects at the α-oxoglutarate
vel. Ornithine was less efficient than arginine.
rhaps this is related to differences in urea and
monia concentration changes in the 2 experiments.

92 THE EFFECT OF TAUROCHOLATE ON THE BILIARY SECRETION OF THYROXINE IN THE RAT LIVER.

.) Hillier, A. P. (Physiol. Lab., Cambridge,
gland). *Endocrinology* 94(1):272-275, 1974.

e secretion of thyroxine into bile by the perfused
t liver is autoregulated--a rise of 2 μg in the
yroxine content of the tissue causes, at its peak,
10-fold increase in the fractional rate of secre-
on. However, if taurocholate is omitted from the
rfusion fluid, the increase is only 1-2 fold.
bsequent addition of bile salt causes a sharp rise
the biliary thyroxine concentration, and injec-
ons of only 25 μg taurocholate stimulate thyroxine
cretion without altering bile flow. The effect
dose dependent and is present at normal concen-
ations of thyroxine but is most pronounced in the
per physiological range. Unlike that of thyroxine,
e concentration of triiodothyronine in bile is
affected by the presence of taurocholate in the
rfusion fluid. It is suggested that thyroxine
ut not triiodothyronine) is being selectively
absorbed from the biliary tract back into the liver
ll, and that taurocholate and high concentrations
of hormone 'stimulate' thyroxine secretion by reducing the proportion which is reabsorbed.

1793 THE EFFECT OF INTERRUPTION OF THE ENTEROHEPATIC CIRCULATION OF BILE ACIDS AND OF CHOLESTEROL FEEDING ON CHOLESTEROL 7α-HYDROXYLASE IN RELATION TO THE DIURNAL RHYTHM IN ITS ACTIVITY.

(E.) Mitropoulos, K. A.; Balasubramaniam, S.; Myant, N. B. (Hammersmith Hosp., London, England). *Biochim. Biophys. Acta* 326(3):428-438, 1973.

Cholesterol 7α-hydroxylase activity was assayed by a direct method in liver microsomal preparations from male Wistar rats adapted to controlled lighting and feeding and subjected to conditions known to modify hepatic synthesis of cholesterol and bile acids. The mass of microsomal cholesterol that acts as substrate for the enzyme (the substrate pool) was estimated in each set of conditions. In cholestyramine-fed and bile-fistula rats, the activity of the enzyme was increased, but the normal diurnal rhythm in activity was maintained. The size of the substrate pool was not increased in the treated animals. In bile-fistula rats the biliary excretion of bile acids and cholesterol assumed a diurnal rhythm in the activity of cholesterol 7α-hydroxylase and in the rate of synthesis of cholesterol in the liver. When cholesterol was added to the food, cholesterol 7α-hydroxylase activity was increased but enzyme activity continued to vary diurnally. Cholesterol feeding increased the size of the substrate pool, suggesting that the increase in activity may be due to an increase in the supply of substrate, rather than to increased capacity of the enzyme.

1794 INVESTIGATIONS OF THE ENTEROBILIARY METABOLISM OF LECITHIN.

(E.) Tompkins, R. K.; King III, W. (Univ. California, Sch. of Med., Los Angeles). *Surgery* 75(2):243-252, 1974.

Simultaneous sampling in pigs of thoracic duct lymph, portal and vena caval blood, and common duct bile after intestinal administration of ^{14}C-lecithin revealed a rapid and progressive rise in the concentration of radioactivity in lipid fractions of the bile extracts. Analyses of the distribution of lipid radioactivity demonstrated triglycerides to be the major form of transport in lymph and blood, whereas 70% of the radioactivity in bile was in the lecithin (phosphatidyl-choline) fraction 8 hr after isotope administration. The data demonstrate that dietary lecithin contributes to biliary lecithin secretion probably by way of its intestinal hydrolytic products. Animals with intact thoracic ducts showed the same cumulative rise in biliary lipid radioactivity as did those with thoracic duct fistulas, suggesting that the intestinal precursors of biliary lecithin synthesis may reach the liver by a route other than the thoracic duct.

1795 INDUCTION OF UDP GLUCURONYLTRANSFERASE IN THE LIVER AND EXTRAHEPATIC ORGANS OF THE RAT.

(E.) Aitio, A. (Dept. Physiol., Univ. Turku, Finland). *Life Sci.* 13(12):1705-1713, 1973.

Extrahepatic UDP glucuronyl transferase was studied in male Wistar rats. UDP glucuronyltransferase (4-methylumbelliferone) activity was enhanced in the liver of the rat after administering phenobarbital, cinchophen or 3-methylcholanthrene, in the lung after administration of cinchophen or 3-methylcholanthrene, and in the kidney after cinchophen. The UDP glucuronyltransferase of the spleen could not be induced with the dosage of the drugs used. Chlorpromazine was not able to induce either hepatic or extrahepatic UDP glucuronyltransferase. Chlorpromazine competitively inhibited hepatic UDP glucuronyltransferase *in vitro*. It is concluded that the capability to form glucuronides and to increase the capability seem to be widely distributed in the tissues of laboratory animals. Capacity of a chemical to induce mixed function oxidase does not necessarily correlate with capacity to induce UDP glucuronyltransferase.

1796 COMPARTMENTATION OF THE EARLY STEPS OF CHOLESTEROL BIOSYNTHESIS IN MAMMALIAN LIVER. *(E.)* Decker, K.; Barth, C. (Fac. Med., Univ. Freiburg, Breisgau, Germany). *Mol. Cell. Biochem.* 2(2):179-188, 1973.

Cholesterol synthesis was studied in the isolated perfused rat liver and with cell-free preparations by incorporation measurements of ^{3}H from ^{3}HOH and of carbon label from [1-^{14}C]-acetate. The following specific inhibitors were used: (-)-hydroxycitrate, kynurenate, and avidin. Fatty acid and cholesterol biosynthesis share a common substrate pool of cytoplasmic acetyl-CoA. The substrate of mevalonate synthesis is furnished by an extramitochondrial pathway of β-hydroxy-β-methylgluraryl-CoA synthesis, which does not include malonyl-CoA. This favors the assumption of a sequence including cytoplasmic thiolase and β-hydroxy-β-methylglutaryl-CoA synthase. Besides its inhibitory action on ATP citrate lyase (-)-hydroxycitrate was found to stimulate acetyl-CoA carboxylase. Acetyl-CoA synthetase activity of liver is localized predominantly in the cytoplasm. The regulatory behavior of the cytoplasmic enzyme points to a lipogenetic function. The cytoplasmic enzyme directs acetate into fatty acid and cholesterol synthesis. Its activity and regulatory behavior fit into an acetate pathway of acetyl group transfer. The expenditure of pyrophosphate bond energy per C_2-unit transferred is the same if the acetate pathway and the citrate-malate cycle are compared. In some situations, however, acetate as a diffusible metabolite may be a more readily available C_2-precursor than citrate. The activity and the regulatory behavior of the extramitochondrial acetyl-CoA synthetase necessitates a reconsideration of the mechanisms which supply acetyl-CoA to the cytoplasmic compartment for both fatty acid and cholesterol biosynthesis.

1797 GLUCOSE REABSORPTION FROM BILE. EVIDENCE FOR A BILIOHEPATIC CIRCULATION. *(E.)* Guzelian, P.; Boyer, J. L. (Yale Univ. Sch. Med., New Haven, Conn.). *J. Clin. Invest.* 53(2):526-535, 1974.

To study the mechanisms of this blood-bile glucose concentration difference, infusions of glucose were administered i.v. to 300-400 g male Sprague-Dawley rats with ligated renal pedicles and to 2 postcholecystectomy patients with indwelling t-tubes. Glucose was assayed in plasma, bile, and rat liver by a hexokinase method specific for D-glucose. In man, glucose was detected in bile when plasma glucose increased above 350 mg/100 ml. When plasma concentrations increased between 400 and 900 mg/100 ml, glucose appeared more rapidly in bile, defining by extrapolation an apparent plasma glucose threshold of 280 mg/100 ml. Intraportal phlorizin, a competitive inhibitor of glucose transport, significantly increased bile glucose concentrations. Plasma-bile concentration differences were also observed in rats after i.v. [3-^{14}C]*O*-methyl glucose (3-*O*-MG) but not after [^{3}H]mannitol. Hepatic glucose levels were never lower than plasma levels and liver-plasma 3-*O*-MG ratios were 0.92 indicating that entry of glucose and 3-*O*-MG into hepatocyte water was not limiting. Furthermore, when sodium dehydrocholate augmented canalicular secretion, biliary glucose excretion increased proportionally suggesting that glucose entry into bile was not impeded. Biliary glucose excretion, increased progressively when estimated hepatic glucose secretion rates exceeded 50 μg/min or when phlorizin was given. Finally, during bile stop-flow experiments, [3-^{14}C]*O*-MG and [^{14}C]glucose were selectively removed from bile compared with [^{3}H]mannitol. The findings suggest that glucose and 3-*O*-MG are reabsorbed from bile after entry at the hepatocyte, accounting for their low bile-plasma ratio. The biliary glucose transport process may be described by Michaelis-Menten kinetics and is analogous to recently defined kinetics for renal tubular reabsorption of glucose. These studies provide evidence that certain products of bile secretion may undergo a "biliohepatic" circulation.

1798 REDUCED SYNTHESIS OF HEPATIC MICROSOMAL CYTOCHROME P_{450} IN THE BILE DUCT LIGATED RAT. *(E.)* Mackinnon, A. M.; Simon, F. R. (Univ. Colorado Med. Ctr., Denver). *Biochem. Biophys. Res. Commun.* 56(2):437-443, 1974.

Cholestasis produced by bile duct ligation was associated with a 50% reduction in hepatic microsomal cytochrome P_{450} content in male Sprague-Dawley rats. Tentative identification of cytochrome P_{450} in washed microsomal fractions was achieved on SDS-urea polyacrylamide gels by its physical properties, half-life and response to pharmacologic agents. The relative synthesis rate of P_{450} apoprotein, determined by a double isotope method, was significantly reduced 3 days after bile duct ligation. P_{450} apoprotein degradation was markedly reduced, with the half-life increasing from 24 to 50 hr. These data indicate that a reduced rate of synthesis, rather than increased degradation, is responsible for reduction of P_{450} in cholestasis.

1799 PARADOXICAL INCREASE IN RATE OF CATABOLISM OF LOW-DENSITY LIPOPROTEINS AFTER HEPATECTOMY. *(E.)* Sniderman, A. D.; Carew, T. E.; Chandler, J. G.; Steinberg, D. (Med. Sch., Univ. California San Diego, La Jolla). *Science* 183(4124):526-528, 1974.

e effect of hepatectomy on the rate of catabolism
 low-density lipoproteins was studied. Blood was
awn from donor swine (Hormel white or miniature)
ighing 30 to 50 kg. Low-density lipoprotein was
acted with ^{125}ICI. The (^{125}I) low-density lipo-
otein was reisolated and sterilized. Experimental
imals were fasted overnight and catheters were
serted in both external jugular veins. A tracer
se of (^{125}I) low-density lipoprotein (less than
 mg of low-density lipoprotein) was injected;
asma samples were obtained and radioactivity was
asured. Less than 2% of the radioactivity was
 the lipid moiety and more than 98% was precipi-
ble with trichloroacetic acid. Reisolation of
w-density lipoproteins from plasma at various in-
rvals after injection showed that 95% or more of
e plasma ^{125}I remained in the fraction. Six days
ter, the animal was anesthetized, the liver was
moved and venous return from the viscera was main-
ined. The disappearance curves from the control
udies were resolved into 2 exponential components
ing least-squares fitting procedures. The average
rrelation coefficients for the least-squares re-
ession lines were 0.974 for the first phase and
984 for the second phase. The half-lives of the
rst (faster) and second (slower) exponentials were
termined from their slopes. The fractional cata-
lic rate was calculated from the slopes and the
ro time intercepts. After hepatectomy, strictly
noexponential disappearance curves were observed
d fitted by using least-squares regression lines.
e average correlation coefficient for these was
995. After hepatectomy, total low-density lipo-
otein levels fell progressively and the rate of
sappearance of low-density lipoproteins was the
me as that for the disappearance of ^{125}I. These
sults in hepatectomized animals strongly support
e conclusions drawn from tissue distribution
udies that the liver represents the major extravas-
lar pool of low-density lipoproteins. It is pro-
sed that the liver (or some function requiring an
tact liver) may affect the metabolism of low-den-
ty lipoproteins in a manner that prolongs its
fetime in the plasma compartment.

00 HISTOCHEMICAL STUDY OF GAMMA GLUTAMYL
TRANSPEPTIDASE (GGT) IN EXPERIMENTAL INTRA-
PATIC AND EXTRAHEPATIC CHOLESTASIS. *(E.)* Ronchi,
; Desmet, V. J. (Acad. Hosp. St. Rafael, Lueven,
lgium). *Beitr. Pathol.* 150(3):316-321, 1973.

istochemical study of Gamma glutamyl transpeptidase
GT) was performed on male Wistar rat liver in ex-
rimental extra- and intrahepatic cholestasis, the
ter induced by Norethandrolone. Intrahepatic
olestasis is characterized by the appearance of GGT
tivity at the canalicular membranes of periportal
renchymal cells; the intensity of the staining reac-
on is relatively dose dependent and rapidly rever-
ble. Extrahepatic cholestasis is characterized by
 early increase of GGT in ductular cells, with con-
mittant appearance of positive staining on the
teral cell membranes of the biliary lining cells.
sitive staining of liver parenchymal cells appears
ly after several days. In comparison with findings
 intrahepatic cholestasis, this is interpreted as the
flection of a superimposed intrahepatic cholestasis produced by the accumulation of biliary constituents in the parenchymal cells. It is concluded that a ductular alteration of the GGT histochemical pattern points towards an extrahepatic cholestasis, whereas a definite increase in parenchymal GGT activity points towards an intrahepatic biliary secretory failure.

1801 HISTOCHEMICAL STUDY OF SO-CALLED "MARKER ENZYMES OF CHOLESTASIS" DURING EXTRAHEPATIC BILE DUCT OBSTRUCTION IN THE RAT. *(E.)* Ronchi, G.; Desmet, V. (St. Rafael Univ. Hosp., Louvain, Belgium). *Beitr. Gerichtl. Med.* 149(3):213-226, 1973.

The histochemical location of gamma glutamyltranspeptidase, leucine aminopeptidase and non-specific alkaline phosphatase was studied in livers of normal rats and of rats with ligated common bile ducts. In normal rat liver gamma glutamyl transpeptidase activity was present at the apical border of the lining cells of bile ducts and ductules. During the first days of cholestasis, original bile ducts and proliferating ductular structures showed a strong positive reaction; enzyme activity was concentrated at the apical pole and at the lateral membranes of the cells. After obstruction of more than 1 week, periportal hepatocytes also presented slight enzyme activity. In normal rat liver leucine aminopeptidase showed a weak positive canalicular pattern. Some portal biliary structures were also positive. After bile duct ligation, the canalicular activity rapidly decreased, whereas the ductular activity increased strongly. Some canaliculi in a narrow periportal area were positive after incubation for alkaline phosphatase. After 1 day of obstruction, all sinusoidal, canalicular and lateral membranes of the parenchymal cells were positive. This decreased from the third day on, but all during the experiment alkaline phosphatase activity remained higher than in control animals. These histochemical results correlated with changes in serum concentrations of these enzymes supporting the hypothesis that variations in liver enzymatic activity directly determine variations in serum levels during extrahepatic obstruction. Further, the liver enzyme activity results from the stimulating effect of cholestasis, causing overproduction and regurgitation of these enzymes into the blood stream.

1802 UTILIZATION OF ADENOSINE AS A TOOL IN STUDIES ON THE REGULATION OF LIVER GLYCOGEN BIOSYNTHESIS. *(E.)* De Sanchez, V. C.; Brunner, A.; Sanchez, M. E.; Lopez, C.; Pina, E. (Fac. Med., Univ. Natl. Autonoma, Mexico City, Mexico). *Arch. Biochem. Biophys.* 160(1):145-150, 1974.

1803 ACUTE HEPATIC LESIONS INDUCED BY CYCASIN. *(E.)* Fukunishi, R. (Pathol. Dept., Kagoshima Univ., Japan). *Acta Pathol. Jap.* 23(3):639-646, 1973.

1804 MASSIVE AND SINGLE CELL NECROSIS IN THE RAT LIVER INDUCED BY AFLATOXIN B_1 AND STERIGMATOCYSTIN. *(E.)* Terao, K. (Sch. Med., Chiba, Univ., Japan). *Acta Pathol. Jap.* 23(3):647-653, 1973.

1805 RELATIONSHIP BETWEEN LIVER CELL INJURY AND CIRCULATORY DISTURBANCE IN THE DEVELOPMENT OF A CARBON TETRACHLORIDE POISONING. *(E.)* Nakata, K.; Fujimoto, K. (Osaka Med. Coll., Japan). *Acta Pathol. Jap.* 23(3):667-673, 1973.

1806 EFFECTS OF CHRONIC ETHANOL TREATMENT ON RAT LIVER LYSOSOMES. *(E.)* Berg, T.; Morland, J. (Inst. Zoophysiol., Univ. Oslo, Norway). *Acta Pharmacol. Toxicol.* 33(56):409-416, 1973.

1807 INFLUENCE OF SPLENECTOMY, PARTIAL HEPATECTOMY AND BILE DUCT LIGATION ON THE GRANULOPECTIC ACTIVITY OF THE RETICULOENDOTHELIAL SYSTEM. *(E.)* Lazar, G. (Inst. Exp. Med., Univ. Montreal, Canada). *Acta Physiol. Acad. Sci. Hung.* 42(3):287-291, 1972.

1808 ACTION OF METABOLIC HORMONES ON THE FINE STRUCTURE OF LIVER CELLS. II. EFFECTS OF HYPOPHYSECTOMY AND CHRONIC ADMINISTRATION OF SOMATOTROPIN. *(E.)* Cardell, Jr., R. R. (Sch. Med., Univ. Virginia, Charlottesville). *Am. J. Anat.* 139(1):49-80, 1974.

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1810 HEPATIC UPTAKE AND BILIARY EXCRETION OF *N*-ACETYL PROCAINE AMIDE ETHOBROMIDE IN THE RAT. *(E.)* Hwang, S. W.; Schanker, L. S. (Dept. Pharmacol., Univ. Missouri, Kansas City, Mo.). *Am. J. Physiol.* 225(6):1437-1443, 1973.

1811 PERINATAL DEVELOPMENT OF INDOCYANINE GREEN BILIARY EXCRETION IN GUINEA PIGS. *(E.)* Hwang, S. W.; Dixon, R. L. (Natl. Inst. Environ. Health Sci., Res. Triangle Park, N. C.). *Am. J. Physiol.* 225(6):1454-1459, 1973.

1812 SUBCELLULAR LOCATION OF RAT LIVER CALCIFEROL-25-HYDROXYLASE. *(E.)* Bhattacharyya, M. H.; DeLuca, H. F. (Dept. Biochem., Univ. Wisconsin, Madison). *Arch. Biochem. Biophys.* 160(1):58-62, 1974.

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1814 THE ENZYME-CATALYZED FORMATION OF BILIRUBIN DIGLUCURONIDE BY A SOLUBILIZED PREPARATION FROM CAT LIVER MICROSOMES. *(E.)* Jansen, P. L. N. (Albert Einstein Coll. Med., Bronx, N.Y.). *Biochim. Biophys. Acta* 338(1):170-182, 1974.

1815 SODIUM EFFECT ON BILIRUBIN UPTAKE BY THE RAT INTESTINAL MUCOSA. *(E.)* Serrani, R. E.; Corchs, J. L.; Rodriguez Garay, E. A. (Fac. Med. Sci., Natl. Univ. Rosario, Santa Fe , Argentina). *Biochim. Biophys. Acta* 330(2):186-191, 1973.

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1818 CARBON TETRACHLORIDE HEPATOTOXICITY: AN EXAMPLE OF LETHAL CLEAVAGE. *(E.)* Rechnagel, R. O.; Glende, Jr., E. A. (Sch. Med., Case Western Reserve Univ., Cleveland, Ohio). *CRC Crit. Rev. Toxicol.* 2(3):263-297, 1973.

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iv. Tokyo, Japan). *J. Natl. Cancer Inst.* 51(6): 341-1844, 1973.

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SECRETION AND METABOLISM

Intestine

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tudies on intestinal oligosacchardidase activity in normal and alloxan diabetes before and after insulin therapy have been done on albino rats. In alloxan diabetes, the activities of lactase, sucrase, and maltase were stimulated by 59.6%, 7.3%, and 31.4% respectively. After insulin therapy (2 units/100 g i.m. for 12 days) the lactase activity was reduced to 23.3% but sucrase and maltase activities were further stimulated by 40.5% and 37.8%, respectively. In normal rats after prolonged insulin therapy (2 units/100 g i.m. for 12 days), the lactase, sucrase, and maltase activities were stimulated by 41%, 46.6%, and 45.7%, respectively. The stimulation of lactase activity in alloxan diabetes was further proved by lactose absorption test in rabbits. There was much elevation of lactose absorption in alloxan diabetes, and after insulin therapy (5 units/kg of body weight) the lactose absorption was greatly reduced.

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e role of calcitonin in postprandial calcium
neostasis was studied in young pigs. When pigs
re fasted for more than 36 hr and then fed, the
asma calcium concentration decreased by 6.1% over
-120 min. In thyroidectomized pigs the plasma
lcium concentration increased by 7.2% when they
re fed after a 36 hr fast. It is therefore sug-
sted that increased calcitonin secretion assists
the control of postprandial hypercalcemia. Di-
t measurement of calcitonin in peripheral plasma
pported this suggestion. The plasma calcium con-
ntration in an intact pig on a normal feeding
gime does not change after a meal and thus the
ssibility of the involvement of one or more humoral
ctors in the stimulation of thyroid C-cells was
vestigated. Exogenous and endogenous gastrin
imulated by meat extract increase calcitonin
cretion rate. This observation can now include
her stimuli to endogenous gastrin, e.g. glycine
l gastric distension. Furthermore, partially
rified enteroglucagon increased calcitonin secre-
n rate from perfused thyroid glands, isolated
situ. Stimulation of endogenous enteroglucagon
the intraduodenal administration of glucose, and
bable stimulation of endogenous pancreozymin by intra-
denal fat, were both associated with an increased
citonin secretion rate from the thyroid gland.
se results support the existence of a gastroen-
o-thyroid C-cell system stimulating calcitonin
retion and thus protecting the skeleton from
essive bone resorption during periods of dietary
ficiency.

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lethysmographic technique was utilized to in-
tigate quantitatively the reactions within the
secutive vascular sections of the small and large
estine of the cat during graded intra-arterial
usion of bradykinin. Bradykinin infusion in
es that reduced vascular resistance evoked a
racteristic increase in intestinal volume, oc-
ring in 2 phases with completely different slopes.
first slope corresponded to a capacity response,
reas the second slow increase in tissue volume,
lected a continuous outward transcapillary
tration. Bradykinin infusion in doses that
e subthreshold with respect to resistance and
acitance responses still evoked a significant
rease in capillary filtration coefficient and
n the vascular smooth muscles were relaxed by
ded infusions of isoprenaline, capillary filtra-
n coefficient was considerably higher at all
od flow levels following superimposed infusions.
se observations suggest that bradykinin increases
permeability of the intestinal exchange vessels.
The vascular effects evoked by bradykinin are in many respects similar to those following activation of the pelvic nerves to the colon, and the results lend additional support to the hypothesis that kinins might be involved in the functional hyperemia of the colonic mucosa.

1893 EFFECTS OF INTESTINAL PEPTIDE MIXTURE G2 AND VASOACTIVE INTESTINAL PEPTIDE VIP ON SPLANCHNIC CIRCULATION IN THE DOG. *(E.)* Thulin, L.; Olsson, P. (Karolinska Inst., Stockholm, Sweden). *Acta Chir. Scand.* 139(8):691-697, 1973.

Splanchnic circulatory effects of the peptide mixture G2, which is derived as a late side-fraction during the preparation of secretin, and the vasoactive intestinal peptide VIP, which is the result of further purification of the G2 fraction, were studied in 10 anaesthetized mongrel dogs. Using electromagnetic flowmeters, blood flows were measured in the hepatic artery proper, the superior mesenteric artery and the portal vein. Cholecystectomy was performed. Systemic, caval and portal pressures were recorded. Vascular resistances were calculated. Group I: Four dogs were given 13 caval and 13, portal 1-min infusions of peptide mixture G2 in 2 dosages, ranging from 0.3 to 4.0 μg/kg/min. Group II: Six dogs were given 24 caval and 24 portal 1-min infusions of VIP in 2 dosages, ranging from 0.03 to 0.45 μg/kg/min. The systemic blood pressure fell with 1-23 mmHg. The blood flow increased with a maximum of approximately 50% in the hepatic artery proper and 30% in the portal vein. It remained unaffected or decreased slightly in the superior mesenteric artery. The vascular resistance decreased, indicating vasodilation, with a maximum of approximately 40% in the hepatic artery proper and 10% in the portal vein. It remained unaffected or increased slightly in the superior mesenteric artery. Within the splanchnic area, the G2 and VIP action was thus highly selective. All effects appeared immediately and were of brief duration. They all showed a dose-response correlation. Caval infusion was as a rule more effective than portal, indicating partial hepatic inactivation of the substances.

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udy, 2 mg glucagon and 30 mg propantheline brom-
e were compared to placebo. In 10 to 30 min after
m. administration there was a significant decrease
duodenal motility and tonicity with glucagon.
th tonicity and motility were near normal at 60
n. Responses to atropine sulfate and propantheline
omide were sometimes evident at 10, 30 and 60 min,
t were variable and not consistently greater than
th placebo. With atropine sulfate and propan-
eline bromide, intensity of reported side effects,
cluding dryness of mouth, nausea, headache,
miting, flushing, and urinary retention, was
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larity with a comcomitant decrease in normal
renchymal contrast staining when the portal
in clears the agent selectively from nontumor
eas, resulting in enhanced tumor visualization.
mor staining was evident in more than 97.5% of
e 332 liver angiographies. Of this 97.5%, well-
fined tumor nodules were evident in 34,3%, well-
veloped tumor vessels with intense staining in
%, and tumors comprised mainly of extremely hyper-
scular metastatic sarcomas and hepatomas were
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2032 THE MEASUREMENT OF GASTRIC TRANSMUCOSAL POTENTIAL DIFFERENCE THROUGH A GASTRODUODENOSCOPE. *(E.)* Cochran, K. M.; Russell, R. I. (Royal Infirm., Glasgow, Scotland). *Gut* 14(11): 903-904, 1973.

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2034 5'-NUCLEOTIDE PHOSPHODIESTERASE ISOENZYME AND HEPATIC CANCER IN NCI-MAYO CLINIC PANEL SERA. *(E.)* Tsou, K. C.; McCoy, M. G.; Enterline, H. T.; Herberman, R.; Wahner, H. (Sch. Med., Univ. Pennsylvania, Philadelphia). *J. Natl. Cancer Inst.* 51(6):2005-2006, 1973.

2035 AUTOMATED CONTINUOUS FLOW HEMAGGLUTINATION INHIBITION TEST FOR HEPATITIS B ANTIGEN IN BLOOD. *(E.)* Se Kwak, K.; Sturgeon, P.; Gitnick, G. L. (Univ. California Sch. Med., Los Angeles). *Vox Sang.* 25(2):97-104, 1973.

2036 PERITONEOSCOPY AND DIRECTED LIVER BIOPSY IN CHILDREN AND INFANTS. *(Ger.)* Selmair, H.; Wildhirt, E. (State Hosp., Kassel, Germany). *Leber Magen Darm* 3(1):20-22, 1973.

See also 1719, 2095, 2112, 2127, 2143, 2159, 2209, 2264, 2267, 2296, 2332, 2429, 2472, 2524, 2527

GASTROINTESTINAL DISEASES

ESOPHAGUS

2037 THE MALLORY-WEISS SYNDROME. *(E.)*

St. John, D. J. B.; Masterton, J. P.; Yeomans, N. D.; Dudley, H. A. F. (Monash Univ. Med. Sch., Melbourne, Australia). *Br. Med. J.* 1(5899):140-143, 1974.

A policy of immediate investigation of patients with hematemesis or melena or both led to the diagnosis of the Mallory-Weiss syndrome in 16 out of 121 patients admitted to a combined medical-surgical unit over 3.5 yr. Endoscopy with a forward-viewing fibreoptic endoscope was performed as the initial investigation on most patients, usually within 8 hr of the time of admission to hospital. The criterion for the diagnosis of Mallory-Weiss syndrome was the finding of single or multiple longitudinal mucosal tears at, or immediately below, the gastro-esophageal junction. irrespective of the presence or absence of a history of vomiting before hematemesis. The mean age was 45 yr. A factor responsible for development of a mucosal tear was identifiable in 10 cases, vomiting or dry-retching preceded hematemesis in 9 and paroxysmal coughing due to acute bronchitis appeared to be responsible in 1. A further 4 patients had had a high consumption of alcohol before the episode of bleeding but they were unable to recall vomiting before the hematemesis. In 12 of the 16 patients, a linear mucosal tear typical of the Mallory-Weiss lesion was identified at esophagogastroscopy performed as the first investigation in hospital with a forward-viewing endoscope. The diagnosis was suspected in 2 more patients when active bleeding was observed at the gastro-esophageal junction, and the diagnosis was confirmed by repeat esophagoscopy 24 hr later in 1 and at laparotomy in the second. Diagnosis of the remaining 2 was made at laparotomy. The severity of blood loss varied greatly. Blood transfusion was not needed in 4 of the 16 patients but, in contrast, continued bleeding and failure of resuscitative measures necessitate laparotomy in 4 others. When surgery is needed because of continued bleeding, correct preoperative diagnosis of the syndrome could greatly reduce the length of the surgical procedure for a condition which can be difficult to identify at laparotomy.

2038 OESOPHAGEAL APOPLEXY. *(E.)*

Smith, G.; Brunnen, P. L.; Gillanders, L. A.; Teo, H. S. (Roy. Infirm., Aberdeen, Scotland). *Lancet* 1(7854):390-392, 1974.

Three cases of spontaneous bleeding into the wall of the lower esophagus with submucosal hematoma formation are described. The 3 cases all occurred in elderly women with some form of dysfunction of the cardia, associated in 2 with the sliding form of hiatus hernia. The third patient had been taking aspirin daily for several years. The presenting symptom was severe and constant pain behind the lower part of the sternum and in the lower part of the posterior chest. For the first patient, esophagoscopy confirmed the radiological findings; the posterior wall of the esophagus bulged forwards from a level of 25 cm downwards. The overlying intact mucosa was purplish and the swelling was fluctuant, consistent with an underlying collection of blood. A plastic stomach tube exerting gentle suction was passed down, and 35-38 cm from the teeth a little fresh blood was aspirated. Thereafter, the tube was passed into the stomach and left there. The patient was fasted and given i.v. fluids and the symptoms gradually subsided over 36 hr. For the second patient, on esophagoscopy, a large piece of liver impacted at about 30 cm was removed. A raised and hemorrhagic ridge about 10 cm long ran down the posterior wall and bulged into the mucous membrane. There was no sign of a complete rupture and the instrument passed easily into a normal stomach. Radiological examination of the third patient showed that there was a left basal pneumonia, while a gastrografin swallow showed hold-up at the cardia due to spasm. There was a submucosal hematoma above this. Conservative treatment with nasogastric aspiration and i.v. feeding continued for a week. In the past there has been a tendency to attribute lower esophageal and cardiac lesions, whether these were mucosal tears or complete ruptures, to excessive retching and vomiting. It has become increasingly clear that an esophageal tear can occur in the absence of vomiting. Thus sudden straining can cause the condition, presumably by suddenly increasing intragastric or intra-esophageal pressure. Severe pain which produces shock immediately after onset is the symptom common to all complete tears. The importance of recognizing this syndrome would appear to be in differentiating it from a complete esophageal tear or from other catastrophes, such as myocardial infarction, acute hemorrhagic pancreatitis and dissection of the aorta. The conservative treatment and good prognosis of esophageal apoplexy emphasize the importance of its identification.

2039 ESOPHAGEAL INTRAMURAL DIVERTICULOSIS: A CLINICAL AND PATHOLOGICAL SURVEY. *(E.)*

Hammon, J. W., Jr.; (Rice, R. P.; Poslethwait, R. W.; Young, W. G., Jr. (Duke Univ. Med. Ctr., Durham, N. C.). *Ann. Thorac. Surg.* 17(3):260-267, 1974.

Case histories are presented of 3 patients (2 men and 1 woman, aged 19-73 yr) with esophageal intramural diverticulosis. In each of these patients, the roentgenogram of the barium-filled esophagus showed multiple tiny outpouchings similar to diverticula along the course of the esophagus; upper esophageal webs or strictures were also present in all patients, and 1 patient had a hiatal hernia. Esophageal motility in 1 patient was normal, but there was a loss of normal motility in the other 2 patients. Biopsies on all 3 patients showed chronic esophagitis with infiltration of the submucosa of the esophagus by round cells and generalized fibrosis of the esophageal wall. The esophageal glands had become impacted with inflammatory material and had consequently become dilated and inflamed. In all patients pathogenic microorganisms were cultured from the interior of the esophagus. Therapy for this condition should be directed at relieving esophageal obstruction and managing reflex by indicated medical or surgical therapy.

40 ESOPHAGEAL MOTILITY IN SYSTEMIC LUPUS
ERYTHEMATOSUS. *(E.)* Ramirez-Mata, M.;
yes, P. A.; Alarcon-Segovia, D.; Garza, R. (Natl.
st. Nutr., Mexico City). *Am. J. Dig. Dis.* 19(2):
2-136, 1974.

ophageal manometric studies made in 50 unselected
tients with systemic lupus erythematosus disclosed
normalities in 16. Absent or abnormally low
ntractions were found at the upper third in 7, at
e lower two-thirds in 3, in the entire esophagus
2, at the lower esophageal sphincter in 2, and
the lower two-thirds plus the lower sphincter in
e other 2. There is no relationship between the
esence of esophageal dysfunction and activity,
ration, or treatment of lupus at the time of the
udy. Esophageal motor disturbances are part of
e spectrum of systemic lupus erythematosus, although
eir presence does not necessarily reflect activity
the disease. Esophageal dysfunction is not
mited to complete aperistalsis but may occur
lectively at various segments of the organ. A
lationship may exist between this segmental involve-
nt and the differences in their muscular components.
us, involvement of the upper third is more apt to
flect striated muscle disturbance such as is found
polymyositis while that which occurs in the lower
o-thirds would indicate an abnormality of function
fecting the smooth muscle as it is seen in pro-
essive systemic sclerosis.

41 REVIEW OF THE MEDICAL MANAGEMENT OF ACUTE
VARICEAL BLEEDING FROM THE ESOPHAGUS.
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42 THE BARRETT SYNDROME. *(Ger.)* Wienbeck,
M.; Heitmann, P.; Dombrowski, H.; Schmitz-
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43 VALUE OF ENDOSCOPIC POLYPECTOMY IN ESO-
PHAGEAL AND GASTRIC TUMORS. *(Ger.)*
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m 3(4):155-162, 1973.

44 GASTROINTESTINAL INVOLVEMENT IN NEUROFIBRO-
MATOSIS (RECKLINGHAUSEN'S DISEASE). *(Ger.)*
hzermeyer, H.; Otto, P.; Seifert, E.; Wagner, H.
(no affil.). *Leber Magen Darm* 3(4):177-181, 1973.

45 LYE STRICTURE OF THE ESOPHAGUS IN CHILDREN:
THE ROLE OF COLON INTERPOSITION. *(E.)*
rney, S. Z. (Univ. Maryland Sch. Med., Baltimore).
Surg. 40(2):105-109, 1974.

46 THE MANAGEMENT OF GASTROESOPHAGEAL REFLUX
INFANTS. *(E.)* Carcassonne, M.; Bensoussan, A.;
ert, J. (Dept. Pediatr. Surg., Univ. Marseille,
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STOMACH

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The effect of medical treatment was studied in 4 patients with end-stage renal failure who suffered from severe spontaneous gastric hypersecretion, associated with very low levels of intraduodenal pH in 2 cases. Atropine decreased the overnight gastric acid output, but the residual acid secretion and duodenal content of acid remained dangerously high in one of the patients. Secretin inhibited the basal gastric secretion of acid in all cases and converted the pH of the duodenal contents to alkaline. While atropine cannot be used to control the gastric hypersecretion, secretin may prove to be valuable in the therapeutic management of the gastric hypersecretion of patients with chronic renal failure. It seems probable that in some patients with chronic renal failure, ulceration of the duodenum is related to abnormally great concentrations of acid in the duodenum. The abnormal duodenal content of acid is associated with, and its injurious effects are aggravated by, an impaired pancreatic response to the acid. While anticholinergic drugs do not appear to be therapeutically effective in controlling the excessive gastric secretion and duodenal content of acid, there may be a place for secretin in the treatment of these patients, particularly if long-acting preparations of secretin become commercially available.

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AND METASTASIS OF CANCER? *(Jap.)*
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gura, Y.; Sakita, T.; Sano, R.; Hirota, E. (Natl.
ancer Ctr., Tokyo, Japan). *Jap. J. Cancer Clin.*
9(1):22-27, 1973.

113 EVALUATION OF 5-YEAR SURVIVAL RATE IN
CASES OF RADICALLY RESECTED ADVANCED GAS-
RIC CARCINOMA BASED ON FACTORS INFLUENCING THE
ROGNOSIS. *(Jap.)* Nagatomo, T.; Murakami, E.
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Clin.* 19(4):343-346, 1973.

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IN THE OLD. *(Jap.)* Kurita, H. (Dept.
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2115 CHEMOTHERAPY FOR GASTRIC CANCER. EVALUATION OF CLINICAL RESPONSES FOLLOWED BY INTRA-AORTIC INFUSION TREATMENT. *(Jap.)* Yoshikawa, K.; Kitaoka, H.; Ito, I. (Natl. Cancer Ctr. Hosp., Tokyo Japan). *Jap. J. Cancer Clin.* 19(7):776-778, 1973.

2116 EXPERIMENTAL ANASTOMOSING CARCINOMA. A CONTRIBUTION TO THE PATHOGENESIS OF GASTRIC CARCINOMA AFTER STOMACH RESECTION. *(Ger.)* Dahm, K.; Werner, B. (Surg. Clin., Univ. Hamburg, Germany). *Langenbecks Arch. Chir.* 333(3):211-236, 1973.

2117 CANCER OF THE STOMACH IN THE AFRICAN. *(E.)* Wapnick, S.; Pfumojena, J. (Godfrey Huggins Sch. Med., Salisbury, Rhodesia). *S. Afr. Med. J.* 48(3):100-102, 1974.

See also 1711, 1975, 1976, 1999, 2022, 2032, 2037, 2043, 2046, 2145, 2221, 2273, 2462, 2464, 2489, 2493

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Peptic Ulcers

118 MEAT EXTRACT-STIMULATED GASTRIC ACID
SECRETION BEFORE AND AFTER PARIETAL CELL
AGOTOMY WITHOUT ANTRUM DRAINAGE AND SELECTIVE GAS-
RIC VAGOTOMY WITH DRAINAGE IN PATIENTS WITH DUODENAL
LCER. *(E.)* Kragellund, E.; Fischer, J. E.;
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cid response to meat extract was evaluated in 25
uodenal ulcer patients before and after parietal
ell vagotomy (PCV) or selective gastric vagotomy
ith antral drainage (SV + P). The pentapeptide
est was performed by stimulation with 6 μg Peptavlon/
g s.c. before the operation (25 patients) and with
0 μg Peptavlon/kg s.c. after the operation (19 pa-
ients). The insulin test was performed by stimula-
ion with 0.2 I.U./kg i.v. in 12 patients before and
n 22 patients after operation. For the meat extract
est, 3 oxo cubes were dissolved in 200 ml warm water
nd pH adjusted to 7.0. This solution was introduced
nto the stomach via the tube and left in the stomach
or 15 min. The stomach was then emptied by 5 min
spiration, rinsed by 200 ml of water, and emptied
y a further 5 min aspiration. Before operation, all
atients responded to meat extract with a signifi-
antly increased acid secretion. Peak acid output-
eat extract averaged 60% of peak acid output-
entapeptide. There was a significant positive corre-
ation between peak acid output-meat extract and
asting acid secretion, basal acid output, fasting
olume, and peak acid output-pentapeptide. After
peration there was still a significant, but less
ronounced positive correlation between the fasting
olume and peak acid output-meat extract. After
peration, peak acid output-meat extract was significantly but less prounounced correlated positive with peak acid output-pentapeptide. A significant covariation of reduction of peak acid output-meat extract with peak acid output-pentapeptide could be demonstrated only in the 12 insulin-negative patients, while reductions of peak acid output-meat extract was much more pronounced than reductions of peak acid output-pentapeptide in the 7 insulin-positive patients The entire instilled amount of meat extract could be recovered preoperatively. After the operation, this was the case in only 7 patients, all of whom had a parietal cell vagotomy. In the remaining 14 patients, only about half of the instilled amount could be obtained by aspiration. Meat extract acid secretion is nil or sparse in patients with antral denervation after complete truncal vagotomy and pyloroplasty and after SV + P. The significant meat extract stimulation in patients with intact antral innervation after PCV and in patients with incomplete (insulin-positive) truncal vagotomy and pyloroplasty seems to indicate that innervation of the antrum is necessary for the acid response to feeding with meat extract.

2119 SELECTIVE OR TRUNCAL VAGOTOMY? FIVE-YEAR RESULTS OF A DOUBLE-BLIND, RANDOMIZED, CONTROLLED TRIAL. *(E.)* Kennedy, T.; Connell, A. M.; Love, A. H. G.; MacRae, K. D.; Spencer, F. A. (Roy. Victoria Hosp., Belfast, Northern Ireland). *Br. J. Surg.* 60(12):944-948, 1973.

The 5-year results of a double-blind, randomized, controlled trial of selective versus truncal vagotomy, each with pyloroplasty, are reported. Of 100 patients entering the trial, 95 are available for study. There were 4 suspected or proven recurrent ulcers in the truncal group and 1 suspected but no proven recurrence in the selective group. The incidence of episodic diarrhea was significantly less in the selective group; 4 mild and no severe cases compared with 11 mild and 2 severe cases among the truncal vagotomies. There was no severe dumping; mild symptoms were more common in the selective group but not significantly so. Miscellaneous dyspeptic symptoms were a little more common in the truncal group. Each patient was given a clinical grading using a simplification of the Visick grading as follows: 1. No symptoms: a perfect result. 2. Mild symptoms: not troublesome. 3. More severe symptoms: some degree of disability. 4. Severe symptoms: recurrent ulcer, disabling side-effects, or reoperation. Attention was particularly concentrated upon dumping and diarrhea, which were graded + when quite trivial and often not complained of spontaneously, or ++ when more severe and a significant nuisance to the patient. Using the modified Visick grading, there were 2 failures in the selective group (grades 3 and 4) and 6 failures in the truncal group. Weight changes, hemoglobin levels, and calcium levels were similar and satisfactory in each group. It is concluded that selective vagotomy is superior to truncal vagotomy when each is combined with pyloroplasty.

2120 MECHANISM OF STRESS ULCER: INFLUENCE OF HYPOVOLEMIC SHOCK ON ENERGY METABOLISM IN THE GASTRIC MUCOSA. *(E.)* Menguy, R.; Desbaillets, L.; Masters, Y. F. (Univ. of Rochester Sch. Med. Dent., N.Y.). *Gastroenterology* 66(1):46-55, 1974.

The influence of hypovolemic shock on energy metabolism in the gastric mucosa is presented as a mechanism of stress ulcer. The pathogenesis of stress ulceration remains unexplained. In preliminary experiments on rats it was found that nonlethal hemorrhagic shock induced by removing a volume of blood equivalent to 2.0% of body weight caused severe gastric epithelial necrosis within 15 min and gross erosions within 45 min. The application of the "energy-deficit" hypothesis to the explanation of this experimental model of stress ulceration formed the basis of our studies. Experiments were carried out on male Holtzmann rats. Levels of adenosine triphosphate, adenosine diphosphate, and adenosine monophosphate, glucose-1-P, glucose-6-P, lactate, pyruvate, and glycogen in "stop-frozen" tissues (gastric glandular mucosa, liver, and skeletal muscle) were estimated 15, 30, 45, or 60 min after the induction of shock, as described above. Identical tissue sampling was performed in nonbled rats. In another series of experiments, the same estimations were done on these tissues after 30 and 60 sec of complete, warm ischemia. This degree of hypovolemia caused within 15 min a 75% drop in adenosine triphosphate-fueled energy in gastric mucosal tissue. Liver tissue was much less severely affected in this regard, and muscle not at all. The differences among these three tissues with respect to the influence of hypovolemia on energy were similar in completely ischemic tissues. The data suggest that the extraordinary vulnerability of gastric mucosal energy metabolism to shock-induced ischemia results from this tissue's lack of glycogen (not described previously) and its relative inability to utilize anaerobic glycolysis as an alternate sourc of energy. It is proposed that a profound decrease in energy metabolism in the gastric mucosa is the cau of the rapid cellular necrosis occurring in this tissue during hypovolemic shock.

2121 GASTRIC ULCERS ASSOCIATED WITH DUODENAL ULCERS: 17 CASES. *(Fr.)* Simler, M. (Univ. Hosp. Ctr., Strasbourg, France). *J. Med. Strasbourg* 4(4):289-298, 1973.

Of 540 peptic ulcers observed in a 6-yr period, 17 (3.1%) were gastric ulcers associated with duodenal ulcers. These combined ulcers accounted for 4.7% of all duodenal ulcers and 9.3% of all gastric ulcers diagnosed. The duodenal ulcer developed first in 12 patients and the gastric ulcer, in 2 patients. The second ulcer developed 1-16 yr after the first. In 16 of these 17 patients the gastric ulcer was located in the lesser curvature. Three patients had 2 gastric ulcers each and another had ulcers in the duodenum, stomach, and esophageal cardia. Of the 8 patients who underwent surgery or autopsy, 4 had an active gastric ulcer and a healed duodenal ulcer and 4 had active gastric and duodenal ulcers. Gastric acid secretion, studied in 11 patients, was increased in 6, normal in 2, and decreased in 3. Biopsies and endoscopic examinations, performed on 7 of these patients, showed atrophic gastritis with no evidence of stasis or retention in all 7, pyloric stenosis in only 1, and bile reflux from the duodenum in 5. Complications included 4 severe hemorrhages from the gastric ulcer and 2 duodenal perforations. Four patients died. These included 2 who died of nonulcer-related bleeding (1 from a neoplasm of the colon and 1 from rupture of esophageal varices complicating cirrhosis and liver cancer) and 2 who died of bleedi gastric ulcers and duodenal perforation. Although these findings are not conclusive, they suggest that the duodenal ulcer generally develops first and the gastric ulcer results from bile refluxing into the stomach from the duodenum rather than from pyloric stenosis.

2122 EFFECT OF TRUNCAL VAGOTOMY WITH PYLOROPLASTY OR WITH ANTRECTOMY ON FOOD-STIMULATE GASTRIN VALUES IN PATIENTS WITH DUODENAL ULCER. *(E.* Becker, H. D.; Reeder, D. D.; Thompson, J. C. (Univ. Texas Med. Br., Galveston). *Surgery* 74(4):580-586, 1973.

The effect of vagotomy with pyloroplasty or vagotomy with antrectomy on the serum gastrin response to a meal has been studied in 17 patients (5 females and 12 males, aged 29-65 yr) with duodenal ulcer. The mean fasting gastrin value among patients was 129 pg/ml which differed significantly from the 84 pg/ml value for the 10 control subjects. After a standard meal, gastrin rose to 189 pg/ml in patients and to 122 pg/ml in controls. Basal gastrin increased from a preoperative value of 130 to 167 pg/ml 3 to 6 months postoperatively in the 10 vagotomy with pyloro plasty patients. After a meal, gastrin increased to 198 pg/ml preoperatively and to 268 pg/ml postoperatively. In the 7 vagotomy with antrectomy patients o significant change in basal or food-stimulated gas-rin values occurred. After vagotomy with pyloroplasty r vagotomy with antrectomy, basal and pentagastrin-timulated acid output was diminished about 70%. ince antrectomy caused no significant change in ither basal or postprandial gastrin values, it ap-ears that there are important extra-antral sources f gastrin and this gastrin can be released into the irculation by food. The results of this study support he suggestion that duodenal ulcer patients may have defect in the normal feedback mechanism for inhibi-ion of gastrin release in the presence of increased ates of acid secretion.

123 THE GASTRIC EMPTYING AND SMALL INTESTINAL TRANSIT AFTER HIGHLY SELECTIVE VAGOTOMY ITHOUT DRAINAGE AND SELECTIVE VAGOTOMY WITH PYLORO-LASTY. *(E.)* Madsen, P.; Kronborg, O.; Feldt-asmussen, K. (Bispebjerg Hosp., Copenhagen, Denmark). *cand. J. Gastroenterol.* 8(6):541-543, 1973.

uodenal ulcer patients (54) were treated with either ighly selective vagotomy without drainage (27) or elective vagotomy and pyloroplasty (27). The pa-ients were examined 6 months later by a nutritional ontrast medium. The gastric emptying time and small ntestinal transit time were shorter after selective agotomy and pyloroplasty than after highly selective agotomy. Fast gastric emptying and intestinal pas-age and fluid diffusion into the small intestine ere more frequent in patients with provoked dumping. ontrast filling of the whole colon was seen in pa-ients with provoked diarrhea. Provoked dumping and iarrhea did not occur after highly selective vago-omy. A preserved antrum innervation and pyloric phincter seem to secure a nearly normal gastric eservoir function. Results of this study also sug-est that rapid gastrointestinal passage is important n the pathogenesis of postvagotomy diarrhea.

124 HISTOPATHOLOGY AND PATHOGENESIS OF BEHAVIORALLY INDUCED GASTRIC LESIONS IN RATS. *E.)* Kristt, D. A.; Freimark, S. J. (New York Univ.-ellevue Med. Ctr., New York). *Am. J. Pathol.* 3(2):411-424, 1973.

he development of behaviorally induced acute gastric tress ulcers was studied in Sprague-Dawley, Holtz-an strain, rats. Rats were first trained to press bar for food. During either 19 or 29 consecutive ays of testing they continued to work for food but ere also stressed by mild foot shock, as this treat-ent is ulcerogenic, though otherwise not physically raumatic. Gastric lesions fell into 2 histologic lasses: an acute ulcerative-hemorrhagic process ith several different manifestations and a focal lear cell metaplasia of the gastric pit epithelium. egarding the pathogenesis of hemorrhagic-ulcerative esions, the ulcers have the appearance of mucusal nfarcts. At times simple hemorrhage was observed nly above or only below the muscularis mucosa, sug-esting that the hemorrhage originated in the plexus f blood vessels in the muscularis mucosa and was he likely result of either thromboembolic occlusion, asoconstriction or extrinsic compression of these essels. Fibrin microthrombi or microemboli were ot apparent. It is suggested that stress induced sustained constriction of the blood vessels of the muscularis mucosa, resulting in focal mucosal infarction. The gastric pit metaplasia may reflect a response to a stress-induced impairment of the protective mucous coat. In addition, preliminary data suggest that ulceration and healing occur continuously throughout the test period, so that no ulcer progressed to perforation.

2125 RELATIONSHIP BETWEEN SERUM GASTRIN CONCENTRATIONS AND GASTRIC ACID SECRETION IN DUODENAL ULCER PATIENTS BEFORE AND AFTER SELECTIVE AND HIGHLY SELECTIVE VAGOTOMY. *(E.)* Kronborg, O.; Stadil, F.; Rehfeld, J.; Christiansen, P. M. (Bispebjerg Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 8(6):491-496, 1973.

Serum gastrin concentrations were measured by radioimmunoassay and studied in relation to gastric acid secretion during insulin tests (0.2 IU/kg, i.v.) performed on duodenal ulcer patients. Studies were conducted both before and about 10 days after operation on 17 patients treated with selective vagotomy and pyloroplasty and in 17 others treated with highly selective vagotomy without drainage. Augmented histamine tests were performed pre- and postoperatively and the results were related to serum gastrin concentrations. The gastrin and acid response to hypoglycemia were positively related before operation, but not after the 2 vagotomies; the acid response had been reduced and the gastrin response remained unchanged. No relation was found between serum gastrin concentrations and histamine-activated acid secretion, either pre- or postoperatively.

2126 INHIBITION BY SECRETIN OF THE GASTRIC ACID RESPONSES TO MEALS AND TO PENTAGASTRIN IN DUODENAL ULCER PATIENTS. *(E.)* Konturek, S. J.; Biernat, J.; Grzelec, T. (Med. Acad., Cracow, Poland). *Gut* 14(11):842-846, 1973.

The inhibitory effects of i.v. secretin on the gastric acid responses to a meal and to pentagastrin were studied in 7 duodenal ulcer patients (aged 22-46 yr). A test meal of 10% peptone adjusted to pH 5.0 was introduced into the stomach and the Fordtran and Walsh method was used to measure the gastric acid output by monitoring the rate at which a solution of 0.3 M sodium bicarbonate had to be added to keep the pH of the gastric content constant at the value of 5.0. A constant dose of secretin (1 U/kg/hr) significantly depressed the serum gastrin response to a meal and inhibited acid secretion by about 70%. Secretin inhibited the acid response induced by pentagastrin (2 μg/kg/hr) by about 60% and simultaneously provoked a pancreatic bicarbonate output sufficient to neutralize about 60% of the gastric acid output to pentagastrin. It was concluded that secretin is a strong inhibitor of gastric secretion induced by a meal and by pentagastrin in duodenal ulcer patients.

2127 PROPRANOLOL AND SERUM GASTRIN IN POSTVAGOTOMY INSULIN TESTS. *(E.)* Hall, W. H.; Durkin, M. G.; Read, R. C. (Little Rock VA Hosp., Oklahoma City, Okla.). *Digestion* 9(4):325-331, 1973.

Serum gastrin was measured by radioimmunoassay during postvagotomy insulin tests in 33 patients. In 11, the study was preceded by propranolol 20 mg, p.o. Gastric acid output was lower in the group pretreated with propranolol. There was no difference in serum gastrin between Hollander positive versus Hollander negative insulin tests. Propranolol affects insulin-stimulated gastric secretion in ways other than by affecting total serum gastrin. These observations reinforce the position that if positive versus negative interpretations of acid secretion in the insulin test have any significance for vagal integrity at all, Hollander's criteria are considerably too sensitive. Although acid secretion stimulated by insulin was reduced after propranolol, serum gastrin was unchanged. Thus, the depressing effect of partial β-adrenergic blockade on insulin-stimulated gastric acid secretion did not appear to be mediated through any effect on serum gastrin concentration.

2128 BILE REFLUX IN GASTRIC ULCER: THE EFFECT OF SMOKING, METOCLORPRAMIDE AND CARBENOXOLONE SODIUM.

(E.) Dippy, J. E.; Rhodes, J.; Cross, S. (Univ. Hosp. Wales, Cardiff). *Curr. Med. Res. Opinion* 1(9):569-575, 1973.

The degree of bile reflux into the stomach was examined during a standard test meal in 26 patients with gastric ulcer. The test meal was repeated within 7 days in 10 patients who smoked during the second test; the degree of reflux increased considerably in 6. In a further 10 patients the test was repeated 15 min after an oral dose of metoclopramide; there was no change in the degree of reflux. In 6 other patients the effect of a single dose and also of 1 week's treatment with carbenoxolone was examined. There was no change in the degree of bile reflux observed in either the second or third tests. Although oral metoclopramide and carbenoxolone appeared to have no effect on bile reflux into the stomach, smoking increased reflux considerably in 6 of 10 patients. The significance of these findings is discussed with reference to therapy in gastric ulcer. It may be that patients who continue to smoke delay healing of gastric ulcer by repeatedly provoking excessive bile reflux into the stomach.

2129 TRANSMITTAL OF RESTRAINT-INDUCED GASTRIC ULCERS BY PARABIOSIS IN RATS.

(E.) Tran, T. A.; Gregg, R. V. (Univ. Louisville Sch. Med., Ky.). *Gastroenterology* 66(1):63-68, 1974.

The transmittal of restraint-induced gastric ulcers by parabiosis was studied in 62 genetically similar female rats of the ARS Fischer 344 strain, with an average weight of 180 grams. One rat of a parabiosed pair was restrained for 28 or 30 hr on a mobile cart which its unrestrained mate was free to pull about. All restrained animals showed gastric ulceration, and 15 of 17 unrestrained mates also developed gastric ulceration. The results show that the factor or factors producing restraint ulcers in the restrained member of a parabiotic pair of rats can be transmitted to the unrestrained mate. This induction of ulcers implicates a humoral factor in the etiology of stress-induced gastric ulcers.

2130 GASTRIN RESPONSE TO INSULIN AFTER SELECTIVE HIGHLY SELECTIVE, AND TRUNCAL VAGOTOMY.

(E.) Stadil, F.; Rehfeld, J. F. (Rigshosp., Copenhagen, Denmark). *Gastroenterology* 66(1):7-15, 1974.

The role played by the vagus in release of immunoreactive gastrin was studied in duodenal ulcer patients before and after selective, highly selective, and truncal vagotomy. Postoperatively, gastrin concentrations before aspiration of the stomach were fro 1 1/2 to 2 times higher than preoperative concentrations. During continuous aspiration, gastrin concentrations decreased significantly after all 3 operations. Basal gastrin concentrations, as measured during aspiration, increased significantly after highly selective vagotomy (17 patients) from 24 ± 1.8 to 35 ± 4.4 pmoles/liter of serum (53 to 77 pg/ml), and truncal vagotomy (18 patients) from 28 ± 3.1 to 43 ± 4.2 (62 to 95 pg/ml), but not after selective gastric vagotomy (17 patients) from 28 ± 2.7 to 33 ± 2.4 (62 to 73 pg/ml). The mean increase after truncal vagotomy was significantly higher than after selective vagotomy, suggesting that extragastric vagal branches, by some action, suppress gastrin release. Before and after the operations, gastrin concentrations in serum increased significantly after intravenous injection of 0.2 IU of insulin/kg. The increase lasted more than 1 1/2 hr and was only moderately affected by the 3 operations. A persisten gastrin response to insulin was also found in 11 patients with truncal vagotomy and anacid specimens of gastric juice during hypoglycemia, when measured with three different antisera. The findings indicate that the release of immunoreactive gastrin by hypoglycemia does not depend solely on the vagus.

2131 ALTERED PANCREATIC AND BILIARY FUNCTION AFTER VAGOTOMY AND PYLOROPLASTY.

(E.) Malagelada, J. R.; Go, V. L. W.; Summerskill, W. H. J. (Mayo Clin., Rochester, Minn.). *Gastroenterology* 66(1):22-27, 1974.

Changes in pancreatic enzyme section and gallbladder contraction occurring after vagotomy and pyloroplasty in 12 patients were investigated and compared with findings from 17 healthy male volunteers and 9 patients with uncomplicated duodenal ulcer. Total lipase and bile acid outputs were quantified, using duodenal perfusion, under basal conditions and in response to both endogenous cholecystokinin-pancreozymin (CCK-PZ) (released by intraduodenal perfusion of essential amino acids) and to exogenous (porcine) CCK-PZ given by vein. After vagotomy and pyloroplast basal pancreatic enzyme outputs were reduced, as were responses to both intraduodenal essential amino acid perfusion and lower doses of intravenous CCK-PZ, but the response to maximal doses of intravenous CCK-PZ was normal. By contrast, gallbladder contraction occurred at a lower dose of intravenous CCK-PZ than in healthy subjects or in patients with duodenal ulcer, although the response to intraduodenal essential amino acids was normal. The results suggest that vagal impulses contribute to pancreatic enzyme secretion in the interdigestive periods; and after vagotomy and pyloroplasty, sensitivity of the pancreas to CCK-PZ decreases and that of the gallbladder increases.

32 GASTRIC ACID RESPONSE TO SHAM FEEDING IN THE DUODENAL ULCER PATIENT. *(E.)* Knutson, ; Olbe, L. (Sahlgrenska Hosp., Stockholm, Sweden). *and. J. Gastroenterol.* 8(6):513-522, 1973.

sham feeding technique was developed for patients erated on for peptic ulcer. The technique permits udy of the gastric acid secretory response to ysiological vagal activation. Patients may eat d swallow an ordinary meal, which is prevented om reaching the stomach by means of a rubber tube, mporarily inserted into the distal part of the ophagus via a gastrostomy. An analysis of the w sham feeding method suggests that it truly flects the acid response to physiological vagal tivation, and that the acid secretory response is producible. Sham feeding for 15 min produced a ar maximal sham feeding acid response. In 18 odenal ulcer patients with intact antrum 15 min am feeding produced an increased gastric acid cretion, usually lasting for more than 2 hr, with mean peak response amounting to 11.7 mEq/30 min 5% of the mean peak acid response to pentagastrin, µg/hr, i.v. for 45 min followed by 300 µg/hr for -60 min, or Histalog, 2 mg/kg, s.c.). No correlaon was found between the peak acid sham feeding sponses and the peak acid responses to pentagasin or Histalog.

33 DOUBLE-BLIND TRIAL OF DEGLYCYRRHIZINATED LIQUORICE IN GASTRIC ULCER. *(E.)* Engqvist, ; Von Feilitzen, F.; Pyk, E.; Reichard, H. (Southn Hosp., Stockholm, Sweden). *Gut* 14(9):711-715, 73.

trial with a double-blind, cross-over design was ed to investigate the reported beneficial effect deglycyrrhizinated liquorice in gastric ulcer. tients were treated during 2 consecutive periods 4 weeks each with either liquorice extract during e first period and placebo during the second or acebo during the first and liquorice during the cond. Only patients with chronic ulcer disease re studied. The site of ulceration included prelotic, canalis, angulus, and corpus. The dosage the liquorice extract was 760 mg, 3 times/day. ring the first period 38 patients with 47 ulcers the ventricle were studied. During the second riod 30 patients with 36 ulcers took part in the ial. The patients' sex, age, site of ulcer in e ventricle, and ulcer size in the groups treated th liquorice and placebo during periods I and II re similar. Nor could any difference be shown tween the groups treated with liquorice and placebo th respect to heredity, duration of ulcer disease, cohol consumption, smoking, or use of drugs. There s no tendency to quicker healing in either group regards change of ulcer area or complete healing. all ulcers healed more quickly than big ones. cers at the angulus healed very poorly. No side fects of treatment were observed. This study did t demonstrate any healing effect of the liquorice tract on gastric ulcer.

34 INHIBITION OF GASTRIC PLASMIN ACTIVITY BY EPSILON-AMINOCAPROIC ACID. *(E.)* Thomson, J. M.; Turner, L.; Poller, L. (Univ. Hosp., South Manchester, England). *Ann. R. Coll. Surg. Engl.* 53(6):340-347, 1973.

Preoperative administration of the antifibrinolytic drug epsilon-aminocaproic acid (3 doses of 0.1 g/kg, p.o.) prevented the release of plasmin activity following digital compression of the stomach at operation in 13 of 14 patients with duodenal ulceration. In a paralleled control series all of 15 duodenal ulcer patients not given epsilon-aminocaproic acid showed marked increase in fibrinolysis, as evidenced by progressive shortening of the lysis times in the serial venous specimens from the first to the third peripheral sample. Areas of lysis indicating plasmin activity were seen in the gastric and third peripheral venous samples in each patient. In 13 of these 15 the activity was also present in the second peripheral venous samples. In addition to the gastric venous blood, the second and third peripheral venous samples showed increased fibrin/fibrinogen breakdown product levels. The epsilon-aminocaproic acid treated series, apart from 1 patient with pyloric stenosis, showed increased plasminogen activator only, presumably due to stress, anesthesia, and no increase of fibrin/fibrinogen breakdown products. Antifibrinolytic drugs may become an important new factor in the management of bleeding from acute gastric erosions, through inhibition of gastric plasmin activity.

2135 PATHOGENESIS AND CLINICA OF STRESS ULCER. *(Ger.)* Zimmermann, F.; Larena, A. (No affil.). *Leber Magen Darm* 3(2):73-80, 1973.

2136 EFFECT OF PARATHYROIDECTOMY ON HYPERCALCEMIA HYPERSECRETORY PEPTIC ULCER DISEASE. *(E.)* McGuigan, J. E.; Colwell, J. A.; Franklin, J. (Univ. Florida, Coll. Med., Gainesville). *Gastroenterology* 66(2):269-272, 1974.

2137 THE IMPORTANCE OF ANALYSIS OF GASTRIC SECTIONS FOR CLINICAL MEDICINE. *(Ger.)* Welsch, K. H. (Surg. Dept., Univ. Polytech., Munich, Germany). *Munch. Med. Wochenschr.* 115(42):1813-1819, 1973.

2138 EARLY RESULTS OF PYLORUS-PRESERVING GASTRECTOMY FOR DUODENAL ULCER. *(E.)* Hennessy, T. P. J.; Weir, D. G. (Dept. Surg., Univ. Coll. Cork, Ireland). *J. Surg. Res.* 15(4):296-300, 1973.

2139 NEW OBSERVATIONS ON THE EFFECT OF PRIMPERAN (METOCLOPRAMIDE) ON THE DIGESTIVE TRACT FROM THE PATHOLOGICAL POINT OF VIEW. *(Fr.)* Yanev, St.; Stoyanova, Z.; Ivanov, P. (Hosp. Princi. Plovdiv, Romania). *Rad. Diag.* 14(3):341-348, 1973.

2140 NEW ASPECTS OF THE PATHOPHYSIOLOGY OF PEPTIC ULCER. *(Ger.)* Ottenjann, R. (Munich-Neuperlach Hosp., Germany). *Munch. Med. Wochenschr.* 116(5):181-184, 1974.

2141 DUODENAL ULCER AND POLYCYTHEMIA. *(Ger.)* Hartwich, G.; Rosch, W.; Farivar, S.; Dette, G. (Med. Clin. Polyclin., Univ. Erlangen/ Nurnberg, Germany). *Munch. Med. Wochenschr.* 116(5): 185-186, 1974.

2142 GASTROINTESTINAL ULCER - ARTHUS REACTION! *(E.)* Siegel, J. (Houston, Texas). *Ann. Allergy* 32(3):127-130, 1974.

2143 THE RADIOLOGICAL APPEARANCES OF THE STOMACH AND DUODENUM FOLLOWING NONEXCISIONAL OPERATIONS FOR GASTRIC AND DUODENAL ULCERS. *(Ger.)* Stauch, G. W.; Lohr, E.; Boettcher, I.; Beersiek, F.; Eigler, F. W. (Univ. Clin., Essen, Germany). *Forschr. Rongenstr.* 120(1):31-41, 1974.

2144 COMPARISON OF THE PROTECTIVE EFFECTS OF DIAZEPAM AND VAGOTOMY ON THE STRESS ULCER IN THE RAT. *(Ger.)* Schumpelick, V.; Paschen, U. (Univ. Clin., Hamburg, Germany). *Arzneim. Forsch.* 24(2):176-179, 1974.

2145 THE CARCINOMA IN THE RESIDUAL STOMACH AFTER ULCER RESECTION. *(Ger.)* Kivelitz, H.; Muller, E.; Kleinschmidt, F.; Loose, D. (Surg. Clin., Univ. Dusseldorf, Germany). *Bruns Beitr. Klin. Chir.* 220(3):253-258, 1973.

See also 2025, 2030, 2089, 2090, 2094, 2103, 2107

SMALL INTESTINE

2146 THE INTESTINAL COMPLICATIONS OF RADIOTHERAPY. *(E.)* Wellwood, J. M.; Jackson, B. T. (St. Thomas's Hosp., London, England). *Br. J. Surg.* 60(10):814-818, 1973.

Clinical findings are reported for 38 patients (26 women, 12 men; aged 39-76 yr) with intestinal complications after radiotherapy for malignant disease. Large-bowel complications occurred in 25 patients and included proctocolitis (18), colorectal stricture (13), anal stricture (4), rectal ulcer (7), spontaneous necrosis (3), and fistula (3). Small-bowel complications developed in 21 patients and consisted of stricture (11), malabsorption (9), spontaneous necrosis (6), fistula (2), and impaired healing (6). Intestinal complications were commonly progressive and led to the death of 14 patients (37%). Of these patients, 9 had no sign of recurrent tumor. Spontaneous necrosis of the irradiated bowel or necrosis of an intestinal anastomosis accounted for 11 of the deaths. Only 3 patients became completely asymptomatic after treatment of their bowel disease. Apparently localized radiation lesions in the small bowel were associated with severe malabsorption of fat, vitamin B_{12}, and calcium. Radiographs showed striking mucosal changes in the small bowel; nodular filling defects resembling small-bowel metastases were also seen. A combined radiotherapy/surgical follow-up clinic is advocated.

2147 SMALL-INTESTINAL INJURY IN WOMEN WHO HAVE HAD PELVIC RADIOTHERAPY. *(E.)* Newman, A.; Katsaris, J.; Blendis, L. M.; Charlesworth, M.; Walter, L. H. (Central Middlesex Hosp., London, England). *Lancet* (7844):1471-1473, 1973.

Small-bowel injury from pelvic irradiation was studied in 17 women who had received intracavitary radium, external x-rays, and telecobalt radiotherapy, alone or in combination. Subjects with evidence of recurrent malignancy were excluded from the study. Of the 17 women, 12 had a permanent increase in stool frequency. The presence and severity of this alteration did not depend on the nature of the lesion treated, the type of radiation received, the dose administered, or whether or not surgery was performed. Sixteen subjects had abnormal cholyglycine-1-(^{14}C) breath tests, including all 12 with symptoms of increased bowel frequency. While 8 of 11 small-bowel x-rays were abnormal, only 1 of 13 rectal biopsies showed inflammatory changes and only 1 showed vascular thickening suggestive of radiation injury. No subject had blood in her stools. It is concluded that alteration in stool habit and interruption of enterohepatic circulation, as indicated by abnormal breath tests, are caused by radiation injury to the small bowel. Such injury is an almost invariable accompaniment to all forms of radiotherapy.

2148 RETROANASTOMOTIC HERNIA. *(E.)* Johnson, J. M.; Wood, M.; Lawson, J.; Hale, H. W., Jr. (Maricopa County Gen. Hosp., Phoenix, Ariz.). *Arch. Surg.* 108(3):363-365, 1974.

Since 1897, 175 cases of retroanastomotic herniations have been reported. Over 30% of the patients who underwent laparotomy died, while all of those who were not surgically treated died. The successful management of 3 additional patients, 2 with efferent-loop herniation and 1 with afferent-loop herniation, is reported. The latter patient, a 49-yr-old man, may be the only one who has survived gangrene of the duodenum secondary to an obstruction with strangulation of the afferent loop. The cause of internal herniation following gastroenterostomy is probably dependent on 3 variables: the length of the afferent limb; retrocolic or antecolic placement; and isoperistaltic or antiperistaltic anastomosis. No gastrointestinal anastomosis is free from potential herniation unless the space is closed by sutures. The majority of herniations show symptoms within the 1st month of surgery, but the symptoms may appear as long as 13 years later. Closure of the internal hernial ring at the time of the initial gastric operation prevents the formation of retroanastomotic hernia.

49 ACUTE INTESTINAL OBSTRUCTION SECONDARY TO
VASCULAR COMPRESSION OF THE DUODENUM.
.) Paul, J. G.; Eggleston, F. C.; Singh, C. M.
hristian Med. Coll., Ludhiana, Punjab, India).
. *J. Surg.* 12(4):658-660, 1973.

ve cases of acute upper intestinal obstruction
used by mesenteric vascular compression of the
odenum are presented. None of the 5 patients (4
ys, 1 girl; aged 16-18 yr) had a history of
strointestinal complaints. All had copius bilious
miting and all were thin; only 1 did not present
th marked dehydration or abdominal distension.
boratory findings were unremarkable, except for
blood urea of 180 mg/100 ml (1 patient), white
ood cell count of 22,000/m cu m (1), mild acidosis
th a base excess of -6.9 mEq/liter (1), and
tabolic alkalosis with a base excess of +10.0
). In 1 patient, patchy gangrene of the stomach
dicated the severity of the obstruction. In other
ses, laparatomy showed the stomach and duodenum
re distended to the crossing of the superior
senteric artery. All patients were successfully
eated by duodenjejunostomy. Mesenteric vascular
mpression in these patients was apparently associa-
d with thiness and a known bulky diet, which may
ve resulted in undue traction on the mesentery.

50 MECKEL'S DIVERTICULUM: UNUSUAL PREOPERA-
TIVE PRESENTATIONS. *(E.)* Martinez, R.;
lbiger, M. L. (Tampa Gen. Hosp., Fla.). *South.*
d. J. 67(4):501-502, 1974.

o unusual preoperative radiologic diagnoses involv-
g Meckel's diverticula are presented: Meckel's
verticulum calculus and Meckel's diverticulum
ading an ileocolic intussusception. Meckel's di-
rticulum leading the intussusception was found in
11-month-old female infant who presented clini-
l signs of small bowel obstruction and rectal
eeding. Roentgenogram clearly demonstrated an
eocolic intussusception led by a diverticulum.
e intussusception could not be successfully re-
ced, and the patient was taken to surgery. Fol-
wing reduction of the intussusception and resection
the diverticulum and a portion of small bowel,
e patient had an uneventful postoperative recovery.
e second patient, a 9-yr-old boy, was admitted
th rectal bleeding, crampy abdominal pain, and
idence of blood loss anemia. A small bowel series
owed a triangular calcification within a diverti-
lum in the distal ileum, which fluoroscopically
owed evidence of contractility. At operation, a
ckel's diverticulum containing gastric mucosa,
localized ulceration, and a triangular calculus
s found. The patient had an uneventful recovery.

51 ENORMOUS DIFFUSE DUODENAL LIPOMATOSIS WITH
MEGADUODENUM AND DUODENAL DIVERTICULUM.
er.) Kuhn, K.; Paul, F.; Krause, H.; Boettcher,
(no affil.). *Leber Magen Darm* 3(2):91-95, 1973.

52 A HYPOTHESIS ON SOME FACTORS GOVERNING
THE BEHAVIOUR OF SHORT SEGMENTS OF THE
ALL BOWEL. *(E.)* Jenkins, D. H. R. (Dept. Clin.
rg., Univ. Edinburgh, Scotland). *Br. J. Surg.*
(12):926-928, 1973.

2153 LATE COMPLICATIONS FOLLOWING SIDE-TO-SIDE ANASTOMOSES WITH SPECIAL REFERENCE TO THE BLIND-LOOP SYNDROME. *(Ger.)* Lennert, K. A.; Lucie, J. (no affil.) *Langenbecks Arch. Chir.* 333(2):81-90, 1973.

2154 A TECHNIQUE TO INCREASE JEJUNAL MUCOSA SURFACE AREA. *(E.)* Binnington, H. B.; Siegel, B. A.; Kissane, J. M.; Ternberg, J. L. (Washington Univ. Sch. Med., St. Louis, Mo.). *J. Pediatr. Surg.* 8(5):765-769, 1973.

2155 INTRAUTERINE VILLUS HYPERTROPHY WITH JEJUNOILEAL ATRESIA. *(E.)* Touloukian, R. J.; Wright, H. K. (Yale Univ. Sch. Med., New Haven, Conn.). *J. Pediatr. Surg.* 8(5):779-784, 1973.

2156 EFFECTS OF THE FIBEROPTIC LAPAROSCOPE AND COLONOSCOPE ON MORBIDITY AND COST. *(E.)* Goldhaber, S. Z.; Bloom, B. S.; Sugarbaker, P. H.; O'Connor, N. E. (Peter Bent Brigham Hosp., Boston, Mass.). *Ann. Surg.* 179(2):160-162, 1974.

2157 LESIONS IN THE RETROPERITONEAL PART OF THE DUODENUM. *(Ser.)* Nedeljkovic, D.; Anojcic, S.; Zdarvkovic, D.; Tomic, L. (Fac. Med., Univ. Belgrad, Yugoslavia). *Srp. Arh. Celok. Lek.* 100(11):1 95-1402, 1972.

2158 PEUTZ-TOURAINE-JEGHER'S SYNDROME. *(Ger.)* Roka, R.; Euler-Rolle, J.; Depisch, D.; Mandel, W.; Priesching, A. (1st Surg. Clin., Univ. Vienna, Austria). *Wien. Klin. Wochenschr.* 86(1):18-20, 1974.

2159 DIAGNOSTIC INFORMATION FROM ROUTINE ENDOSCOPY OF THE DUODENAL BULB. *(Ger.)* Kratochvil, P.; Harnoncourt, K. (Provincial Hosp., Graz, Austria). *Wien. Klin. Wochenschr.* 86(1):15-17, 1974.

2160 DUODENAL CANCER. REPORT OF A CASE. *(E.)* Edman, P. (Gen. Hosp., Sandviken, Sweden). *Acta Chir. Scand.* 139(8):759-762, 1973.

2161 DIAPHRAGMATIC COMPRESSION OF THE CELIAC AXIS. SURGICAL CURE. *(Fr.)* Warter, J.; Kieny, R.; Storck, D.; Jeanmaire, H. (Central Hosp., Strasbourg, France). *J. Med. Strasbourg* 4(2): 87-93, 1973.

2162 INTESTINAL OBSTRUCTION IN PREGNANCY. *(E.)* Beck, Jr., W. W. (Univ. Pennsylvania Sch. Med., Philadelphia). *Obstet. Gynecol.* 43(3): 374-378, 1974.

2163 GANGRENE OF MECKEL'S DIVERTICULUM IN PREGNANCY DUE TO IRON TABLET. *(E.)* Alaily,

A. B. (St. Mary's Hosp., Manchester, England). *Brit. Med. J.* 1(5898):103, 1974.

2164 THE ROLE OF GLUTEN, MILK, AND OTHER DIETARY PROTEINS IN CHRONIC OR INTERMITTENT DYSPEPSIA. *(E.)* Pock-Steen, O. C. (Frederiksberg Hosp., Copenhagen, Denmark). *Clin. Allergy* 3(4):373-383, 1973.

2165 TUBULAR DUPLICATION OF THE SMALL INTESTINE: MULTIPLE COMMUNICATION WITH THE INTESTINE. *(Fr.)* Michalland, G.; Boureau, M.; Capitaine, P. (Bretonneau Hosp., Paris, France). *Ann. Chir. Infant.* 14(2):151-156, 1972.

2166 THE PSEUDO-OBSTRUCTION OF BOWEL SYNDROME: A SUGGESTION OF A SIMPLE SURGICAL REMEDY. *(E.)* Chaimoff, C.; Dintsman, M. (Beilinson Hosp., Petah Tiqva, Israel). *Am. J. Proctol.* 25(1):39-47, 1974.

2167 MECKEL'S DIVERTICULUM PRESENTING AS FISTULA-IN-ANO. *(E.)* McKay, I.; Calder, J. (Royal Infirm., Glasgow, Scotland). *Brit. Med. J.* 4(5883):31-32, 1973.

2168 MECKEL'S DIVERTICULUM. *(E.)* Berkley, K. M. (Southern Illinois Clin., Mt Vernon). *Ill. Med. J.* 145(2):125-127, 1974.

2169 LATE STENOSIS OF BOWEL SEGMENT OF ILEAC CONDUIT (PIPE-STEM LOOP). *(E.)* Esho, J.; Ireland, G.; Blackard, C.; Cass, A. (St. Paul-Ramsey Hosp., Minneapolis, Minn.). *Urology* 3(1):30-33, 1974.

2170 DUODENAL DUPLICATION. SURGICAL TREATMENT USING A UNIQUE METHOD OF LOCATING THE AMPULLA OF VATER. *(E.)* Parnes, I. H. (Mt. Sinai Hosp., New York, N.Y.). *Am. J. Gastroenterol.* 60(4):406-407, 1973.

2171 INTESTINAL NEUROFIBROMAS IN VON RECKLINGHAUSEN'S DISEASE. *(E.)* Davis, G. B.; Berk, R. N. (Dept. Radiol., Univ. California, San Diego). *Am. J. Gastroenterol.* 60(4):410-414, 1973.

2172 ON 31 CASES OF INTESTINAL PERFORATION CAUSED BY TYPHOID: THE VALUE OF TEMPORARY RESECTION AND ILEOSTOMY. *(Fr.)* Spay, G.; Ejazy, M. M.; Rahimi, N. (A. Le Dantec Hosp., Dakar, Senegal). *Lyon Chir.* 69(6):431-436, 1973.

2173 PSEUDOLYMPHOMA OF THE COLON: TWO CASES. *(Fr.)* Khoukaz, M.; Tabbara, W. (Sacred Heart Hosp. Beirut, Lebanon). *J. Med. Liban.* 26(4):401-406, 1973.

2174 A CASE OF THE ADENOCARCINOMA OF THE DUODENOJEJUNAL JUNCTION. *(Jap.)* Ohtsuki, Y.; Matsuo, K.; Tsuda, H.; Nakagawa, J.; Tokumo, M.; Shirai, M. (Okayama Univ. Med. Sch., Japan). *Jap. J. Cancer Clin.* 19(4):362-365, 1973.

2175 PRIMARY INTESTINAL LYMPHOMA: CLINICAL MANIFESTATIONS AND POSSIBLE EFFECTS OF ENVIRONMENTAL FACTORS. *(E.)* Ramot, B.; Many, A. (Tel-Aviv Univ. Med. Sch., Israel). *Recent Results Cancer Res.* 39:193-199, 1972.

2176 BLEEDING MECKEL'S DIVERTICULUM AS LARGE AS A MAN'S FIST. *(Ger.)* Hessing, J.; Stolze, T. (2nd Med. Clin., Univ. Dusseldorf, Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 120(1):112-113, 1974.

2177 LATE DETECTION OF TUMORS OF THE SMALL INTESTINE. *(E.)* Aszodi, A.; Zer, M.; Dintsman, M. (Beilinson Hosp., Petah Tiqva, Israel). *Int. Surg.* 59(2):87-90, 1974.

See also 1949, 1955, 1963, 1972, 2032, 2085, 2098, 2102, 2105, 2109, 2110, 2178, 2212, 2244, 2276, 2292, 2421, 2434, 2453, 2464, 2495, 2535.

SMALL INTESTINE

Malabsorption

2178 TUMORS AND EOSINOPHILIC GRANULOMAS OF THE SMALL INTESTINE IN MALABSORPTION. *(Ger.)* Balmer, F.; Stucki, P.; Pedrinis, E.; Halter, F. (Inselspital, Bern, Switzerland). *Schweiz. Med. Wochenschr.* 104(3):78-83, 1974.

Case reports are presented for 6 patients who had malabsorption syndrome associated with benign or malignant tumors of the small intestine. These patients consisted of 4 men and 2 women who were 40-68 yr old when the tumor was diagnosed and who had histories of steatorrhea dating back 2-19 yr. In all cases the diagnosis of malabsorption was based on clinical findings and total or subtotal villous atrophy found in biopsies of the small intestine. Temporary clinical improvement occurred in 4 patients when they were placed on a gluten-free diet. In 4 of the 6 cases the tumor was diag-

sed at emergency laparotomy after spontaneous
rforation of the small intestine resulting from
crotic colliquation of one or more tumors. In
e remaining 2 cases the tumor caused partial ob-
ruction and a radiological filling defect in the
odenum and jejunum, resp. Tumors consisted of
und to polymorphocellular sarcomas (2 cases),
sinophilic granulomas (2 cases) a reticulum cell
rcoma (1 case), and an adenocarcinoma (1 case).
rvival times after surgery ranged from 3 days to
yr. One patient with an eosinophilic granuloma is
ive and well 3 yr after surgery. The long inter-
l from onset of steatorrhea to tumor development
d early villous atrophy suggest that the tumor is
condary to malabsorption. Although changes in
munoglobulins have been suggested as a cause for
e increased incidence of neoplasms in malabsorption,
l of these patients had normal serum immunoglobulin
vels.

79 SECRETIN CELLS IN COELIAC DISEASE. *(E.)*
Polak, J. M.; Pearse, A. G. E.; Van
orden, S.; Bloom, S. R.; Rossiter, M. A. (Roy.
stgrad. Med. Sch., London, England). *Gut*
(11):870-874, 1973.

munofluorescence (anti-secretin), cytochemical, and
trastructural studies were carried out on jejunal
opsies from 16 children (aged 9 months to 14 yr)
th celiac disease and from 17 children (aged 12
nths to 14 yr) with suspected malabsorption but
rmal jejunal morphology. In 11 of the 16 celiac
tients, immunofluorescence showed generalized
perplasia of endocrine cells and, specifically,
the secretin (S) cells. Most celiac biopsies
d subtotal villous atrophy and 3 showed partial
llous atrophy. Large numbers of argyrophilic
lls were found in 4 celiacs, moderately large
mbers in 6 and a smaller number in a single case.
the 11 celiac cases, 10 showed numerous or very
merous positively stained cells with lead hematoxy-
n. Electron microscopy also revealed large numbers
S cells as well as intermediate, enterochromaffin,
d enteroglucagon cells in both control and celiac
opsies. Further studies, on adult celiacs as well
on children, combined with serum assays may
tablish whether the S cells are abnormally storing
rmone because of inability to release it or be-
use of excess production.

80 THE IMMUNOHISTOCHEMISTRY OF THE INTESTINAL
MUCOSA IN MALABSORPTION SYNDROME IN CHIL-
EN. *(Fr.)* Joe, J. (Hosp. Enfants-Malades, Paris,
ance). *Ann. Gastroenterol. Hepatol. (Paris)*
2):139-147, 1973.

munofluorescence techniques were used to examine
biopsies from the small intestine of 23 children
th celiac disease, 13 biopsies from 11 children
th intolerance to cow's milk, 8 biopsies from
ildren with other gastrointestinal diseases (4
th protein-losing enteropathy, 2 with colitis,
d 2 with idiopathic malabsorption), and 9
opsies from normal controls with no evidence of
labsorption or intestinal lesions. Biopsies were
ken before and after treatment and during challenge
in patients with malabsorption. Serum immunoglobulins (Ig) were also determined. In children with active forms of celiac disease the absolute number of cells secreting IgA and IgM was increased as was the serum IgA level. In untreated patients with intolerance to cow's milk the number of cells secreting IgA and serum IgA levels were increased. In one patient with celiac disease associated with an IgA deficiency there were no cells in the intestinal mucosa which secreted IgA, but the number of cells secreting IgM was significantly increased. In protein-losing enteropathy no changes were found in the relative proportions of IgA-, IgG-, and IgM-secreting cells, but the levels of almost all serum Ig Fractions were decreased. Although these findings suggest that an immunological mechanism is involved in the malabsorption syndrome studied, the relation between immunological abnormalities and intestinal lesions remains unknown.

2181 PLASMA AND URINARY ZINC IN PATIENTS WITH MALABSORPTION SYNDROMES OR HEPATIC CIRRHOSIS. *(E.)* Walker, B. E.; Dawson, J. B.; Kelleher, J.; Losowsky, M. S. (St. James's Hosp., Leeds, England). *Gut* 14(12):943-948, 1973.

Plasma and urinary zinc were measured in 19 pa-patients with malabsorption and 21 patients with hepatic cirrhosis. The results were compared with those of 20 control subjects and 23 patients with a variety of other diseases. The diurnal variation in plasma zinc levels has been confirmed and is of such magnitude that this must be taken into account in comparing results in groups of subjects. Plasma zinc levels, both fasting and after a meal, are significantly lower in patients with cirrhosis (71 and 60 μg/100 ml) and malabsorption (76 and 64 μg/100 ml) than in controls (97 and 81 μg/100 ml). In the patients with cirrhosis or malabsorption similar correlations exist between plasma zinc and plasma albumin, suggesting that the low plasma zinc levels may be at least in part, dependent on the plasma albumin level. Urinary zinc excretion is increased in cirrhosis, but not in malabsorption, indicating that increased urinarly loss is unlikely to explain the low plasma levels.

2182 THE OCCURRENCE OF CYSTIC FIBROSIS AND CELIAC SPRUE WITHIN A SINGLE SIBSHIP. *(E.)* Franklin, J. L.; Asquith, P.; Rosenberg, I. H. (Pritzker Sch. Med., Univ. Chicago, Ill.). *Am. J. Dig. Dis.* 19(2):149-155, 1974.

A family in which cystic fibrosis and celiac sprue occurred within the same sibship is studied and 3 case reports are presented. The Index Case was a 29-yr-old white housewife. Physical examination revealed a thin pale female with a large smooth tongue, slight finger clubbing, and abdominal distention. A peroral jejunal biopsy showed complete loss of normal villous architecture, cuboidal epithelium, and a marked increase in the inflammatory cell infiltration in the lamina propria and epithelial cell layer. The patient was placed on a gluten-free diet and 2 weeks later noted that her bowel movements changed from watery and greasy to solid and reduced in frequency from 5 or 6 to 1 or 2 times each day. Three months after an uneventful pregnancy, the patient was restudied, 15 months after gluten withdrawal. Small bowel biopsy showed partial villous formation, a return to normal columnar epithelium, and a decrease in the inflammatory cell infiltrate. A clinical diagnosis of celiac sprue was suggested on the basis of the clinical hematological and biochemical features including the increased fecal fats, the low D-xylose excretion, the low serum folate associated with a malabsorption of pteroylmonoglutamate and heptaglutamates, and the abnormal X-ray appearances of the small intestine. Case 2 was a 21-yr-old school teacher and female cousin of the index case. She was evaluated becase of a history of celiac disease in childhood. A clinical diagnosis of celiac sprue was made and the diagnosis was confirmed by the appearance of the jejunal biopsy and her response to gluten withdrawal which included an increased feeling of well being, a reduction in stool count, and a return to normal of D-xylose excretion. The 12-yr-old sister of the index case developed respiratory infection at the age of 3 weeks requiring hospitalization. A diagnosis of cystic fibrosis was made. The demonstration of both cystic fibrosis and celiac sprue in the same family is important and means that all cases of malabsorption in a family, although superficially similar, must be separately investigated; it cannot be assumed that all have either celiac disease or fibrocystic disease. Both diseases may occur in the same individual.

2183 THE EFFECT OF GLIADIN PEPTIDES ON RAT-LIVER LYSOSOMES IN RELATION TO THE PATHOGENESIS OF COELIAC DISEASE. *(E.)* Cornell, H. J.; Townley, R. R. W. (Roy. Children's Hosp., Melbourne, Australia). *Clin. Chem. Acta* 49(2):181-188, 1973.

Several fractions of a peptic-tryptic-pancreatic digest of wheat gliadin were evaluated for their effect on rat liver lysosomes in studying the etiology and pathogenesis of celiac disease. On incubation with lysosome suspensions, Fraction 9 caused a greater degree of disruption of the lysosomes than did any other primary fraction of the digest. The activity of Fraction 9 was measurable at concentrations of 10^{-4} M. Peptides remaining after incubation of Fraction 9 with homogenates of duodenal mucosa from 5 children with celiac disease in remission still had an appreciable effect on lysosomal membranes, in contrast to residues obtained from digestion with homogenates from control individuals. It is suggested that the primary abnormality in celiac disease is a deficiency of an intestinal peptidase which allows accumulation of unduly high concentrations of certain gluten peptides in the gut. The present results indicate that the lesion of celiac disease may be due to the direct effect of such peptides on lysosomes, although less idrect or complementary mechanisms of pathogenesis can not be excluded. These results point to peptides present in Sub-fraction 2 of Fraction 9 as the most active to lysosomes. Subfraction 2 contains 3 major groups of peptides; 2 are active to lysosomes.

2184 WHIPPLE'S DISEASE PRESENTING AS PLEUROPERICARDITIS. *(E.)* Pastor, B. M.; Geerken, R. G. (Madigan Gen. Hosp., Tacoma, Wash.). *Am. J. Med.* 55(6):827-831, 1973.

A diagnosis of Whipple's disease was made by peroral jejunal biopsy in a 48 yr old woman with pleuropericarditis of unknown etiology who had been followed for 4 yr prior to the onset of clinical and laboratory signs of malabsorption. Pretreatment immunologic investigations revealed lymphopenia, decreased immunoglobulin G levels, 580 mg/100 ml, with normal immunoglobulin A and M serum levels, and marked impairment of delayed hypersensitivity. Procaine penicillin (1.2 million units) and streptomycin (1.0 mg, i.m.) were given for 10 days. The patient was thereafter maintained on tetracycline (0.5 g twice/day) for 1 yr. Following successful treatment, the total lymphocyte count and serum immunoglobulin G level returned to normal, and there was no demonstrable impairment in delayed hypersensitivity. This latter observation contrasts with recent reports of immunologic investigations in Whipple's disease patients which demonstrated that most continue to manifest significant deficits in delayed hypersensitivity despite successful therapy.

2185 INTOLERANCE OF SMALL AMOUNTS OF LACTOSE BY INDIVIDUALS WITH LOW LACTASE LEVELS. *(E.)* Bedine, M. S.; Bayless, T. M. (Johns Hopkins Univ. Med. Sch., Baltimore, Md.). *Gastroenterology* 65(5):735-743, 1973.

Lactose (3 to 96 g) was fed to 20 subjects with assay-confirmed low lactase levels to determine a threshold level for symptoms of lactase intolerance. Of these 20, 75% had symptoms of flatulence, distention, cramps, loose bowel movements, or diarrhea with 12 g of lactose (equivalent to 8 ounces of milk) or less. With as little as 3 g of lactose, 2 individuals were symptomatic. All 20 subjects were asymptomatic with equivalent amounts of sucrose or a glucose-galactose mixture. Neither the type of symptoms, the specific intestinal lactase levels, nor the presence of the irritable colon syndrome correlated with the threshold level for symptoms. To determine the intraluminal events occurring with small amounts of lactose, 7 low lactase level subjects and 3 control subjects underwent intestinal intubation with aspiration ports in the duodenum, jejunum, and ileum. They received 24, 12, 6 or 3 g of lactose with polyethylene glycol, a nonabsorbable marker, in a solution similar to the electrolyte composition of milk. Subjects with low lactase levels had persistently low polyethylene glycol concentrations in the jejunum and ileum, representing fluid accumulation, as compared with control subjects, in whom high concentrations of polyethylene glycol in the jejunum and ileum represented net absorption. Differences from control subjects were statistically significant in the jejunum and ileum for 24 g and 12 g of lactose and in the jejunum for 6 g of lactose. In addition to the increased fluid load, the concentrations of sodium in the duodenum were higher in low lactase level subjects (mean 64.6

nEq/liter) than in control subjects, and potassium
concentrations in the duodenum were lower (mean 7.1
nEq/liter) than in controls. Thus, there was ob-
jective evidence of fluid and sodium accumulation
in the small bowel with these small lactose loads.
It is presumed that increased speed of transit and
intracolonic fermentation are also significant in
symptom production.

2186 AMINO ACID TRANSPORT SYSTEMS AND THEIR
SIGNIFICANCE IN DISEASE. II. SPECIFIC
NOMALIES OF RENAL AND INTESTINAL TRANSPORT OF AMINO
CIDS. *(Fr.)* Boisse, J.; Moatti, N. (Bicetre Hosp.
tr., Paris, France). *Ann. Biol. Clin.* 31(4):249-
55, 1973.

187 POSSIBLE RELATIONS BETWEEN INTESTINAL
LYMPHORETICULOSARCOMA AND MALABSORPTION
YNDROMES. *(It.)* Capelli, A.; Dalmonte, P. R.;
ertoni, F.; Martinelli, G.; Baccarani, M. (Inst.
athol., Univ. Bologna, Italy). *Anatomia*
4(1-2):117-119, 1974.

188 LACTOSE INTOLERANCE AND MILK CONSUMPTION:
THE RELATION OF TOLERANCE TO SYMPTOMS.
E.) Stephenson, L. S.; Latham, M. C. (Cornell Univ.,
rad. Sch. Nutr., Ithaca, N.Y.). *Am. J. Clin. Nutr.*
7(3):296-303, 1974.

2189 LACTOSE MALABSORPTION AND MILK TOLERANCE IN KENYAN SCHOOL-AGE CHILDREN. *(E.)* Pieters, J. J. L.; Van Rens, R. (Univ. Agriculture, Wageningen, Netherlands). *Maandschr. Kindergeneesk.* 41(4):116-126, 1973.

2190 SELECTIVE VITAMIN B_{12} MALABSORPTION IN TWO SIBLINGS. *(E.)* Khakee, S. Stachewitsch, A.; Katz, M. (Montreal Children's Hosp., Canada). *Can. Med. Assoc. J.* 110(1):53-55, 1974.

2191 THE METHOD OF INTRALUMINAL PERFUSION OF THE HUMAN SMALL INTESTINE. III. ABSORPTION STUDIES IN DISEASE. *(E.)* Rambaud, J. C.; Modigliani, R.; Bernier, J. J. (Hosp. St. Lazare, Paris, France). *Digestion* 9(4):343-356, 1973.

2192 SUCRASE-ISOMALTASE DEFICIENCY: A FREQUENTLY MISDIAGNOSED DISEASE. *(E.)* Ament, M. E.; Perera, D. R.; Esther, L. J. (Dept. Med., Univ. Washington, Seattle). *J. Pediatr.* 83(5):721-727, 1973.

See also 2014, 2268, 2483, 2503.

LARGE INTESTINE

193 CARCINOMA OF THE RECTUM IN OLD AGE. *(E.)*
Jensen, H.-E.; Balslev, I.; Fenger, H. J.;
ragelund, E.; Nielsen, J. (Munic. Hosp., Copen-
agen, Denmark). *Acta Chir. Scand.* 139(6):563-
67, 1973.

he results of treatment of 356 patients, aged over
0 yr, with carcinoma of the rectum are discussed.
f the 356 patients, 48% were not operated, or under-
ent only laparotomy, and some relieving or local
rocedure. The remaining 185 patients (52%)
nderwent low anterior resection, perineo-abdominal
xtirpation in 2 sessions, or adbomino perineal ex-
irpation in 1 section. All resections and 50% of
he extirpations were performed after bowel steriliza-
ion. Primary operative mortality in the 185
atients undergoing resection or extirpation was
1%. In 82 patients undergoing laparotomy with
r without some palliative procedure, mortality was
2%. Of all the 356 patients, 22% died during ad-
ission, and 55% within the first year. Of the
3 patients not operated, or in whom only a
alliative procedure (98), 74% died within 1 yr.
ine (12%) of the 73 lived for 2 yr, 2 for 5 and
yr. In the 185 patients undergoing resection or
xtirpation, primary operative mortality was 21%,
nd 5-yr survival rate, 31%. The findings from a
omparable study of 523 patients aged less than
0 yr were significantly less, 8% and 48% respective-
y. Adenocarcinoma patients had the best prognosis,
5-yr survival rate of 34%. The rate in colloidal
arcinoma patients was 18%. Operative mortality in
the 225 patients aged over 70 yr of the colon carcinoma study was 13%. It is concluded that the aged with carcinoma should be treated on the same principles as younger patients.

2194 EPITHELIAL MISPLACEMENT IN ADENOMATOUS POLYPS OF THE COLON AND RECTUM. *(E.)* Greene, F. L. (Yale-New Haven Med. Ctr., Conn.). *Cancer* 33(1):106-217, 1974.

During an 8-yr period, 747 adenomatous polyps were removed either alone or in association with a known colonic cancer and were reviewed to determine whether benign-appearing adenomatous epithelium could be located below the level of the muscularis mucosae (misplacement) unassociated with the additional pathologic signs of invasive cancer. Of 637 polyps unassociated with cancer resection, 3.2% showed evidence of benign "misplacement," while this entity was found in 28% of the adenomas removed in association with 596 resections for cancer. Adenomatous misplacement is associated with cystic dilatation in the polyp head, hemosiderin deposition in the stalk, and normal lamina propria which surround adenomatous tissue appearing below the muscularis mucosa. Cytology of the "misplaced" structures is identical to the benign adenomatous pattern seen on the polyp surface. This entity must be differentiated carefully from the appearance of invasive cancer in adenomatous polyps in order to avoid unnecessary radical colonic resections. Previous statistical analyses regarding the association of gross malignancy and "invasive cancer" in adenomas need to be critically analyzed.

2195 INFLUENCE OF PREOPERATIVE RECOGNITION OF HIGH-GRADE RECTAL CANCERS ON TREATMENT AND RESULTS. *(E.)* Penfold, J. C. B. (St. Mark's Hosp., London, England). *Dis. Colon Rectum* 17(1):47-51, 1974.

The pathologic findings of the excised specimens from 174 cases of high-grade rectal cancer were correlated with the subsequent outcome of the patients. There was 143 excisions and 33 resections. Nearly half of the patients died within the first 12 months. The 5-yr survival was 15%. There were 7 cases of pelvic recurrence, and only 3 of those followed excision of tumors in the upper 66% of the rectum. There was no recurrence in those resected. There were 114 patients whose tumors occurred in the upper two thirds of the rectum and who were thus eligible for either excision or resection. Many of the tumors from the resected cases were average-grade on preoperative rectal biopsy, and only after thorough examination of the operative specimens were the growths assessed as high-grade. There were 72 patients with high-grade tumors in the upper third of the rectum and rectosigmoid. There were 40 with excision and 32 with resection. Of these, 7 of the 40 and 4 of the 32 are alive. There were 29 tumors showing downward spread, which is microscopic tumor below the visible lower edge of the tumor either in the bowel wall or in the surrounding tissues. All of these 29 patients died from cancer. The tumors of the 26 patients who survived 5 yr did not show any downward spread. It is concluded that despite confirmation that high-grade cancers show more extensive local spread, more extensive rectal excisions have not improved results, and may have resulted in increased short- and long-term morbidity.

2196 FAMILIAL DIFFUSE POLYPOSIS OF THE COLON AND RECTUM: SUPPLEMENTARY REPORT ON THREE PEDIGREES. *(E.)* Schutte, A. G. (St. Joseph's Hosp., Milwaukee, Wis.). *Dis. Colon Rectum* 16(6):517-523, 1973.

A supplementary report is presented on familial diffuse polyposis of the colon and the rectum. One of the members of the first family group died at age 54 with a diagnosis of biliary cirrhosis and adenocarcinoma of the common bile duct. No metastatic bowel cancer was found. The oldest of his 4 sons manifested diffuse polyposis at the age of 11 yr. At the age of 12, he underwent colectomy and ileoproctostomy. There was no regression of polyps, and at the age of 19, he had proctectomy and ileostomy. One of the original brothers had diffuse polyposis. After subtotal colectomy and surveillance, he developed adenocarcinoma of the rectum during the sixth decade of his life. He died at about 60 yr of age. Of his 2 children, the daughter was affected with familial polyposis at the age of 17 yr. Another original brother had numerous polyps in all segments of the colon. He died at the age of 40 yr of polyposis and cancer of the midrectum. A son of one of the brothers had subtotal colectomy at the age of 14 yr and proctectomy and ileostomy for rectal cancer when 20 yr old. In the second family group, an examination of the 4 daughters of one of the sisters showed their freedom from inherited polyposis to have persisted to the ages of 41, 39, 37, and 35 yr. An only brother had subtotal colectomy at the age of 16 yr. Only one living sister of 4 remains free of the disease at the age of 53 yr. In the third family group, a 30-yr-old man was seen over a period of 30 years with rectal polyps which were periodically fulgurated. His mother had surgical treatment for an obstructive, metastasizing tumor of the left colon associated with colonic polyposis. A sister is still free of polyposis at the age of 55 yr. Complete regression of polyps following subtotal colectomy with low-level ileosigmoidostomy of ileoproctostomy has not been observed. This study illustrates the variation in the severity of familial polyposis and the unpredictability of its course as found in members of related and unrelated families. After the onset of polyposis, the symptoms which emerge are dependent upon the rate of increase in the number and/or size of the adenomas and/or development of adenocarcinoma.

2197 LOCALIZED ULCERATION OF THE CAECUM DUE TO MICROCIRCULATORY THROMBOSIS: A NEW CONCEPT OF NON-SPECIFIC ULCERATION OF THE CAECUM. *(E.)* Hardie, I. R.; Nicoll, P. (Dept. Surg., Univ. Queensland, Australia). *Aust. N.Z. J. Surg.* 43(2):149-157, 1973.

Case reports of 3 patients with lesions of the cecum are presented. The first case was of a 34-yr-old woman with 2 days' history of colicky abdominal pain, periumbilical at first, but later localized in the right iliac fossa. A diagnosis of subsiding appendicitis was made. At operation there was considerable thickening, edema and inflammation of the anterolateral wall of the cecum adjacent to the appendix, which was distended and tense, but showed only mild serosal inflammation. Crohn's disease was diagnosed and right hemicolectomy performed. She made an uncomplicated recovery. Macroscopically, the cecal wall was thickened, with mucosal congestion and several areas of shallow ulceration immediately distal to the ileo-cecal junction. Microscopically, this ulceration varied from partial to complete, and in adjacent areas there was a slight increase in chronic inflammatory cells, although no evidence of specific colitis. The second case was a 29-yr-old man who had had constant right iliac fossa pain for 4 days, no alimentary upset, and dysuria for 2 days. At laparatomy, there was a moderate amount of free fluid in the peritoneal cavity, and a thickened area in the antero-medial wall of the cecum just above the ileo-cecal junction. Cecotomy was performed, revealing mucosal ulceration on and around this lesion, which was then locally resected. His postoperative recover was uneventful. Macroscopically, the cecal wall was markedly edematous, with partial mucosal ulceration. Microscopically, the upper layers of mucosa were lost with coagulative necrosis of the deeper mucosa. The third case was a 70-yr-old man with 1 week's history of abdominal pain, which began centrally, but later moved to the right iliac fossa, and was associated with anorexia and constipation. At operation for appendicitis, a mass was palpable in the cecal wall ust below the ileo-cecal junction and as carcinoma ould not be excluded resection of the cecum and erminal ileum was performed. Macroscopically, the ass was edematous cecal wall with an indurated ulcer hich on microscopic examination showed loss of the pper layers and coagulative necrosis of the remainder f the mucosa, the muscularis mucosa being intact in ll sections. All 3 patients are well, with no astrointestinal symptoms or signs, after 2, 6, and yr, respectively.

198 SQUAMOUS-CELL CARCINOMA OF THE ANUS. *(E.)*

Failes, D.; Morgan, B. P. (Sydney Hosp., ustralia). *Dis. Colon Rectum* 16(5):397-401, 1973.

retrospective study is presented of 76 patients ith squamous-cell carcinoma of the anus. There ere 11 patients with anal-margin carcinoma. The verage age was 56 yr; 4 were women and 7 were men. hey were treated by a variety of methods: 4 by adiotherapy, 5 by local excision, and 2 by abdomino-erineal excision. Of 9 patients available for 5-yr ollow-up studies, 6 (67%) had survived 5 yr. There ere 65 patients with anal-canal carcinoma, the average ge was 66 yr. There were 41 women and 24 men. espite the accessible nature of these lesions, diagosis was often late, and many tumors were in adanced stages when first seen. Of 12 patients whose esions were suitable for palliative treatment only, nvolved nodes occurred in 5 (41%). Of the remaing 53 patients, such nodes occurred in only 7. The verage survival time for the 12 patients who reeived palliative treatment was 8 months. Radioherapy rarely controlled the disease. Of the 21 ases initially treated by radiotherapy, 18 were vailable for follow-up, but only 3 (17%) could be egarded as having been cured by this means of treatent. The use of radiotherapy with the hope of preerving anal sphincter function and avoiding colostomy as most unsuccessful. Conservation of the sphincter y wide local resection with preservation of part of he sphincter was attempted in 7 patients. Two have urvived for 5 yr. This method cannot be recommended s the primary procedure of treatment for anal-canal esions. In 25 patients radical surgery was performed s the primary treatment. The usual operation was bdomino-perineal resection of the rectum, although patients underwent colostomy followed by perineal xcision of the rectum. Of 19 patients available for -yr follow-up studies, 8 survived 5 yr. Block disection of inguinal lymph nodes was carried out only hen the nodes appeared to be clinically involved. he overall 5-yr survival rate in this series of 59 atients was 37%; for anal-canal lesions, 32%; for nal-margin lesions, 67%. It is concluded that radioherapy is an unsatisfactory method of treatment and hat radical excision is the only method of treatment hich carries reasonable prospects of cure.

199 DEVELOPMENT OF CANCER ASSOCIATED WITH INFLAMMATORY ULCEROHEMORRHAGIC CHANGES IN HE COLON AND RECTUM. *(Ger.)*

Roenspies, U.; aegesser, F. (Dept. Surg., Univ. Lausanne, Switzerand). *Helv, Chir. Acta* 40(5/6):719-726, 1973.

Of 104 patients with ulcerative colitis during a 5-yr period, 6 (mean age 43 yr) developed carcinomas; 2 had carcinomas in 2 different sites (5.4%). Carcinomas developed in 4 of 11 patients who had symptoms for more than 15 yr. The mean time elapsed from onset of ulcerative colitis was 16 yr. Most of the tumors were rectal adenocarcinomas, but 1 tumor was found in the cecum and another in the right colonic flexure. Survival ranged from 5-38 months (mean 17.7 months). Of 21 patients with radiation-induced proctocolitis, 3 developed malignant tumors (2 adenocarcinomas of the sigmoid and 1 peritoneal fibrosarcoma) 8, 4, and 17 yr, resp. after irradiation for primary tumors of the inguinal region, ovary, and corpus uteri. Survival times ranged from 1 to 3 yr. No relation was found between the dose of radiation and development of cancer, but the association between radiation-induced proctocolitis and cancer is not likely to be fortuitous. Of 6 patients with obstructive ischemic colitis, 2 developed carcinomas: an adenocarcinoma of the rectosigmoid and a carcinoma in the left colonic flexure.

2200 SOME CASES OF THE IRRITABLE BOWEL SYNDROME STUDIED BY INTRALUMINAL PRESSURE RECORDINGS. *(E.)*

Champion, P. (Univ. Hosp., Leiden, Germany). *Digestion* 9(1):21-29, 1973.

Intraluminal pressure recordings were used to study some cases of the irritable bowel syndrome. There were 36 cases of irritable bowel syndrome; 20 were studied through the measurement of activity and pressure changes in the lumen of the distal colon using a water-filled polythene manometric system. After a period of rest, the activity of the colon was recorded for 1 hr before and 1 hr after the i.m. administration of 0.1 mg neostigmine. The X-ray findings of a barium enema indicated 19 normal and 17 hyperactive or spastic; of a small bowel enema, 29 normal, and 4 hyperactive or spastic. The pain in the abdomen included the whole abdomen (4); right hypochondrium (2); left hypochondrium (3); right iliac fossa (7); left iliac fossa (6) and suprapubic (10). There were 3 with pain alone, 16 with pain and diarrhea; 4 with diarrhea alone; and 13 with constipation and pain. They varied in age from less than 9 to 49. Personality problems existed in 15 (41%) with diarrhea, and 10 (28%) with constipation. The colon pressure recordings from probable normals with symptoms (7 cases) before neostigmine were: total number of waves (3); average wave time 3.3 sec; and total activity, 108 sec. After neostigmine, the respective numbers were 120, 14.0 sec, and 594 sec. The colon pressure recordings for 6 cases of irritable bowel syndrome between attacks before neostigmine were: total number of waves, 40; average wave time, 15.1 sec; and total activity, 605 sec. After neostigmine, the respective numbers were 171, 24.3 sec, and 4,175 sec. The colon pressure recordings for 4 cases of irritable bowel syndrome with symptoms before neostigmine were: total number of waves, 76; average wave time, 29 sec; and total activity, 2,239 sec. After neostigmine, the respective numbers were 63, 56 sec, and 3,520 sec.

2201 DIFFUSE POLYPOSIS OF THE COLON WITH SEVERE ELECTROLYTE DEPLETION. *(E.)* Sanner, Jr., R. F.; (Cable Mem. Hosp., Ipswich, Mass.). *Arch. Surg.* 107:903-905, 1973.

2202 VILLOUS ADENOMA OF THE RECTUM. *(Ger.)* Shamiyeh, F. (Hosp. Barmherzige Schwester, Linz, Austria). *Munch. Med. Wochenschr.* 115(42):1827-1830, 1973.

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2210 THE IVALON-SPONGE-WRAP OPERATION FOR RECTAL PROLAPSE: AN EXPERIENCE WITH 26 PATIENTS. *(E.)* Boutsis, C.; Ellis, H. (Westminster Med. Sch., London, England). *Dis. Colon Rectum* 17(1):21-37, 1974.

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2250 MODERN PRINCIPLES OF SURGICAL AND COMBINED TREATMENT OF CANCER OF THE RECTUM AND LARGE BOWEL. *(E.)* Melnikov, R. A.; Snejko, L. I. (N. N. Petrov Sci. Res. Inst. Oncol., Leningard, USSR). *Am. J. Proctol.* 24(5):400-402, 1973.

2251 MELANOMA OF THE RECTUM. *(E.)* Sergeev, S. I.; Smirnova-Stetsenko, E. S.; Golbert, S. V.; Khrushchov, M. M.; Simakina, E. P.; Oserskij, A. N. (P.A. Gerzen Oncol. Res. Inst., Moscow, USSR). *Am. J. Proctol.* 24(5):411-416, 1973.

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See also 1640, 1957, 1978, 1979, 1980, 1982, 1990, 1992, 2001, 2021, 2027, 2076, 2083, 2146, 2149, 2156, 2158, 2162, 2166, 2276, 2288, 2379, 2426, 2435, 2453, 2489, 2493, 2495, 2521, 2522, 2533, 2535.

LARGE INTESTINE

Ulcerative Colitis

2254 SIEVING CHARACTERISTICS OF INFLAMED RECTAL MUCOSA. *(E.)* Rask-Madsen, J. (Glostrup Hosp., Denmark). *Gut* 14(12):988-989, 1973.

The sieving characteristics of inflamed rectal mucosa were studied in 3 healthy volunteers and 5 patients suffering from ulcerative colitis localized to the rectum, Gel filtration of urine following rectal instillation of ^{125}I-polyvinylpyrrolidone (^{125}I-PVP) was applied for the estimation of molecular weight distribution of ^{125}I-PVP absorbed from the rectum and excreted by the kidneys during the first 5 hr. The molecular size distribution of labelled PVP in the urine samples taken from the controls following rectal instillation shows only activity in the low molecular weight fractions. The results obtained in the patients with active inflammation of the rectum were similar to those obtained in controls, the clearances of high molecular fractions following rectal instillation being insignificantly different from zero. It is concluded that this study supports the view that the increased permeability of the inflam rectal mucosa to both small charged particles and hydr philic compounds is due primarily to ultrastructural changes rather than to macroscopic defects of the diseased epithelium.

2255 A CONTROLLED THERAPEUTIC TRIAL OF LONG-TERM MAINTENANCE TREATMENT OF ULCERATIVE COLITIS WITH SULPHASALAZINE (SALAZOPYRIN). *(E.)* Dissanayake, A. S.; Truelove, S. C. (Radcliffe Infirm., Oxford, England). *Gut* 14(12):923-926, 1973.

The effect of sulphasalazine on ulcerative colitis was studied in 64 patients in a controlled therapeutic trial. The patients entered into a controlled trial of sulphasalazine versus placebo tablets for a period f 6 months. All the patients admitted were not only ymptom-free but also showed no evidence of inflamation on sigmoidoscopy and rectal biopsy. A patient as judged to have relapsed when there was a recurrence f colitic symptoms accompanied by sigmoidoscopic and istological evidence of inflammation. The patients ho received placebos had more than 4 times the reapse rate of those receiving sulphasalazine. The esults were similar in patients who had been on mainenance treatment with sulphasalazine for less than 3 ears before entry into the trial and in those who ad been on this treatment for more than 3 years. t is concluded that maintenance treatment of ulceraive colitis with sulphasalazine should be continued ndefinitely unless contraindicated by side effects.

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2258 SOME RECENT VIEWS OF ULCERATIVE COLITIS AND CROHN'S DISEASE IN THE COLON. *(E.)* Barany, F. (St. Erik's Hosp., Stockholm, Sweden). *Lakartidningen* 70(36):3051-3071, 1973.

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See also 1990, 2001.

PANCREAS

261 FUNCTIONAL STUDY OF EXOCRINE PANCREAS IN IDIOPATHIC HEMOCHROMATOSIS, UNTREATED AND REATED BY VENESECTIONS. HEMOCHROMATOSIS, UNTREATED ND TREATED BY VENESECTIONS. *(E.)* Simon, M.; osselin, M.; Kerbaol, M.; Delanoe, G.; Trebaul, L.; ourel, M. (Hosp. Pontchaillou, Rennes, France). *igestion* 8(6):485-496, 1973.

study was made of the exocrine pancreas, based on he analysis of duodenal juice after secretin (1U/kg) nd CCK (3U/kg) injection in patients with untreated diopathic hemochromatosis (22 cases, 2 females and 0 males, aged 32-36 yr) and in patients treated with epeated venesections (10 cases, 2 females and 8 males, ged 32-60 yr). Comparisons were made with 10 normal ontrols; 13 common cirrhotic patients, 12 of whom ad certain alcoholism and 11 had evident portal ypertension; and 10 subjects with calcified pancreaitis. No clinical symptom of the hemochromatosis atients correlated to pancreatic disease. The volume f duodenal juice collected during 40 min following ecretin injection ranged from a high of 521 ml in ntreated hemochromatosis, 363 ml in cirrhosis, 153 l for venesection-treated hemochromatosis (not signiicantly different from controls, 169 ml) to 79 ml or calcified pancreatitis patients. Maximum bicaronate concentration after secretin dropped from conrol values of 99.5 mEq/l to 62 mEq/l in untreated emochromatosis, 60 mEq/l in cirrhosis and 75 mEq/l n treated hemochromatosis. Maximum bicarbonate output fter secretin was not significantly different in reated hemochromatosis (3.3 mEq/10 min) and controls 4.6 mEq/10 min), but measured 10.2 mEq/10 min in unreated hemochromatosis and 8.5 mEq/10 min in cirrhosis. fter CCK the maximum lipase concentration in treated hemochromatosis was 116.5 U/ml, not significantly different from controls, but the figures in untreated hemochromatosis were 94U/ml and for cirrhosis, 98.5 U/ml. It was concluded that the secretory characters of untreated idiopathic hemochromatosis are not important in the increase of iron absorption.

2262 UPTAKE OF METHYLCHOLANTHRENE IN THE RAT PANCREAS. *(E.)* Black, Jr., O.; Webster, III., P. D. (VA Hosp., Augusta, Ga.). *Am. J. Dig. Dis.* 19(1):37-42, 1974.

The chemical carcinogen, ^{14}C-3-methylcholanthrene (5μ Ci, i.p.), was injected into white, male, Sprague-Dawley rats to determine to what extent rat pancreas sequesters and metabolizes this drug. The carcinogen was taken up in the pancreas to the same degree as the liver on a per gram wet weight basis. The greatest percent of radioactivity, 41%, appeared in the nuclear and cell membrane fractions. The next highest, 27%, appeared in endoplasmic reticulum. Only 17% remained in the supernatant fraction. Maximal incorporation occurred around 36 hr following administration. Ether extracts of homogenates revealed that few breakdown products were formed even up to 48 hr after injection. It appears that rat pancreas sequesters 3-methyl-cholanthrene but has little metabolizing capacity.

2263 DIFFERENTIAL DIAGNOSIS OF TUMORS IN THE HEAD OF THE PANCREAS DURING SURGERY: RESULTS OF CONVENTIONAL HISTOLOGICAL AND MODERN CYTOLOGICAL EXAMINATIONS. *(Ger.)* Bodner, E. (Surg. Clin., Univ. Innsbruck, Austria). *Langenbecks Arch. Chir.* 333(3):165-190, 1973.

The results of preoperative diagnostic techniques were poor in 107 patients (67 men and 40 women, aged 38-87 yr) with tumors of the head of the pancreas; 79 had carcinomas and 19 had inflammatory tumors. Pathological findings were obtained in 17 of 91 patients by studies of gastroduodenal transit, in 8 of 21 patients by hypotonic duodenography, in 18 of 31 by pancreatic scintigraphy, in 7 of 18 by celiac-mesenteric arteriography, and in 15 of 22 by the pancreozymin-secretin test. At the first operation a definitive diagnosis of carcinoma was established only in 39 of 79 patients; 23 already had gross evidence of metastases and a diagnosis was established by histological examination of the primary tumor in 16. In 38 more patients tumors were diagnosed at pancreatoduodenectomy, at subsequent laparotomy, or at autopsy. Diagnoses were established only by clinical follow-up in the remaining 30 cases; the diagnosis is still unconfirmed in 9. Complications developed in 15 of the 37 patients who had conventional biopsies. The most common complication was pancreatic fistula which developed in 11 patients; 9 fistulas healed spontaneously but 2 persisted until the patients died. Other complications consisted of subphrenic abscesses (2 patients), WBC elevation (7), bleeding (1), and death (1). Cytological examinations were made by 4 different techniques (preoperative examination of duodenal juice and examination of pancreatic juice, pancreatic duct smears, and fine-needle suction biopsies obtained during surgery) on 36 patients. These consisted of 19 with malignant tumors of the head of the pancreas, 10 with pancreatic pseudocysts, and 7 controls. The best results were obtained with biopsies. Positive diagnoses of malignancy were established in 11 and possible diagnoses of malignancy in 4 patients with pancreatic carcinomas; results could not be evaluated in 7 of the 10 patients with pseudocysts due to the presence of blood and detritus in the sample. No false-positive results were obtained. Although a few patients had elevated urinary diastase and α-amylase levels after biopsy, these never reached alarming values.

2264 RESECTABILITY AND PROGNOSIS OF CARCINOMA OF THE PANCREAS EVALUATED BY ANGIOGRAPHY.

(E.) Tylen, U.; Arnesjo, B. (Univ. Hosp., Lund, Sweden). *Scand. J. Gastroenterol.* 8(8):691-697, 1973.

Results of angiographic examination of the pancreas were correlated with resectability and survival of 116 patients with verified carcinoma of the pancreas or the periampullary region. Among 56 patients with encasement of extrapancreatic arteries or the gastroduodenal artery, radical tumor removal was possible in only 8 and survival time was always less than 1 yr, usually less than 6 months. In 26 patients with encasement of the gastroduodenal artery, resection was possible in 6 and none survived 12 months. This survival time differed only slightly from patients with the same angiographic findings in whom resection was impossible. It is however advised that patients with involvement of the gastroduodenal artery but not extrapancreatic arteries be explored and radical resection attempted as this is the most beneficial palliative measure against pain available. Tumor encasement of small arteries or with tumor vessels occurred in 60 patients and radical resection was possible in 25 of whom 6 died postoperatively. The longest survival time thus far is 9 yr, for a patient with carcinoma at the papilla of Vater. Survival of more than 2 yr occurred in 7 patients. These results illustrate the poor prognosis of patients with carcinoma of the pancreas and periampullary region. The good correlation between the extension of angiographic changes and the extension of tumor growth makes angiography useful in the preoperative evaluation of pancreatic carcinoma.

2265 MAXIMUM BICARBONATE RESPONSE TO INTRAVENOUS INFUSION OF 'GIH' SECRETIN IN MAN. *(E.)*

Gutierrez, L. V.; Baron, J. H. (Roy. Postgrad. Med. Sch., London, England). *Clin. Sci. Mol. Med.* 45(6): 859-862, 1973.

Studies were made of the pancreatic bicarbonate response to GIH infusion in 6 subjects without pancreatic disease, 1 with chronic pancreatitis and 2 with carcinoma of the pancreas. In 21 tests the maximum volume and bicarbonate output of the duodenal aspirate in response to i.v. infusion of pure GIH secretin was significantly higher with 4 than with 1 or 2 units/kg-hr, and there was no consistent change in these outputs after 8 units/kg-hr. Tryptic activity was lower in each subject after 2 than 1 unit/kg-hr and lower still after 4 units/kg-hr with no significant change occurring after 8 units/kg-hr. The optimum maximum dose of secretin in man is probably 4 units/kg-hr. The highest dose, 8 units/kg-hr, was tested only in subjects without pancreatic disease.

2266 PANCREATIC REFLUX DURING OPERATIVE CHOLEDOCHOGRAPHY. *(E.)*

Cuschieri, A.; Hughes, J. H. (Dept. Surg., Univ. Liverpool, England). *Br. J. Surg.* 60(12):733-736, 1973.

The incidence and significance of pancreatic reflux was studied in 211 consecutive cases undergoing elective cholecystectomy where an operative choledochogram was performed using either hand or pump injection of dye. The age range of patients was 28 to 72 yr. Reflux of contrast medium into the pancreatic duct occurred in 23 out of 166 cases of hand injection (13. and in 8 out of 45 consecutive cases of pump injection (17.7%). Out of the total 211 cases, 1 patient developed acute pancreatitis after surgery with a rise in the serum amylase of 2050 Somogyi units per 100 ml. Eight out of the 31 pancreatograms obtained showed an abnormal pancreatic duct. There were 18 cases of ductal stones and pancreatic reflux was present in only 1 of these. Reflux of sodium diatrizoate into the pancreatic duct was observed in 8 cases where dynamic pressure changes could be monitored simultaneously in the common-bile-duct and second part of the duodenum. In these cases, pancreatic reflux was associated with a low resting choledochal pressure. No association was found between ductal stones and reflux of dye into the common bile-duct. Pancreatic reflux was associated with a low biliary pressure and segmental duodenal activity.

267 THE "UROLOGICAL" PANCREATIC CYST - A DIAGNOSTIC ENIGMA. *(E.)* Von Garrelts, .; Nyman, C. R.; Schalin, L. (Karolinska Hosp., tockholm, Sweden). *Int. Urol. Nephrol.* 5(1):3-8, 973.

268 INBORN AND ACQUIRED MALABSORPTION OF LACTOSE IN CYSTIC FIBROSIS. *(Ger.)* Niessen, H.; Brugmann, G.; Schmidt, K.; Osswald, P. (Chilren's Clin., Univ. Tubingen, Germany). *Mschr. Kinrheilk.* 122(1):1-5, 1974.

269 CURRENT THERAPY APPROACHES OF THE DIVISION OF CANCER TREATMENT WITH EMPHASIS ON PANREATIC CARCINOMA. *(E.)* Carter, S. K. (Natl. Caner Inst., Bethesda, Md.). *J. Surg. Oncol.* 6(1): -17, 1974.

270 CANCER OF THE PANCREAS. *(E.)* Kalberer, Jr., J. T. (Natl. Cancer Inst., NIH., ethesda, Md.). *J. Surg. Oncol.* 6(1):1-8, 1974.

271 PANCREATIC TRAUMA AND IDIOPATHIC RETROPERITONEAL FIBROSIS: A LONG-TERM FOLLOW-UP TUDY OF 4 PATIENTS. *(E.)* Pollock, A. V. (Scarrough Hosp., Yorkshire, England). *Br. J. Surg.* 1(2):112, 1974.

2272 MASSIVE HEMORRHAGE INTO THE UPPER DIGESTIVE TRACT DUE TO RUPTURE OF SPLENIC ARTERY ANEURYSM INTO THE PANCREAS. *(E.)* Soeno, T.; Kakizaki, G.; Fujiwara, Y.; Noto, N.; Ishidate, T. (Akita Univ. Sch. Med., Japan). *Am. J. Gastroenterol.* 61(1):55-62, 1974.

2273 GASTROCOLIC FISTULA SECONDARY TO PANCREATIC ABSCESS. *(E.)* Saha, S. P.; Stephenson, Jr., S. E. (Univ. Hosp., Jacksonville, Fla.). *S. Med. J.* 67(3):361-368, 1974.

2274 TRAUMATIC PSEUDOCYSTS OF THE PANCREAS. PHYSIO-PATHOLOGICAL INTERPRETATION AND TREATMENT. *(Fr.)* Marquand, J.; Guivarch, M.; Barbas, A. (Foch CMC, Suresnes, France). *Chirurgie* 99(2):148-154, 1973.

2275 FUNCTIONAL STATUS OF THE EXOCRINE PANCREAS IN TOXIC GOITER. *(Rus.)* Alifanov, A. T. (6th Munic. Clin. Hosp., Odessa, USSR). *Vrach. Delo* (1):88-90, 1974.

See also 1611, 1951, 1952, 1968, 1988, 2011, 2106, 2131, 2182, 2310.

PANCREAS

Pancreatitis

276 INTESTINAL OBSTRUCTION DUE TO ACUTE PANCREATITIS. CASE REPORT AND REVIEW OF ITERATURE. *(E.)* Agrawal, N. M.; Gyr, N.; McDowell, .; Font, R. G. (VA Hosp., New Orleans, La.). *Am. . Dig. Dis.* 19(2): 179-185, 1974.

he case of a patient who presented with complete uodenal and partial colonic obstruction is reported. he patient, a 33-yr-old negro male, known alcoholic, omplained of periumbilical pain for 3 days and onstipation of 5 days duration. An upper GI series evealed crescent-shaped obstruction at the beginning f the second portion of the duodenum and markedly elayed passage of barium into the jejunum. Duoenoscopy showed complete obstruction of the duodenum 0 cm beyond the pyloric opening. Submucosal hemorhages were present all over in the duodenum. The uodenal mucosa was intact. During exploratory aparotomy, an inflammatory mass was found in the ight upper quadrant involving the hepatic flexure, mall bowel, and the omentum. On separation of the mall bowel and the colon from the mass, two areas f chocolate-colored fluid collection were found in he adhesions. The peripancreatic peritoneal fibrous eaction and adhesions were obstructing the second ortion of the duodenum. Gastrostomy was performed nd a feeding tube was passed through the stomach and the duodenum into the jejunum. On the twelfth postoperative day, the gastrostomy tube was removed and the patient could eat without any difficulty. Acute pancreatitis can be associated with a variety of complications, such as obstructive jaundice, pseudocyst of the pancreas, pancreatic abscess, pancreatic fistula, hemorrhage, shock, ascites, and pleural effusion with a mortality of about 5%. Intestinal obstruction is an uncommon complication of pancreatitis. This patient is the first case where simultaneous obstruction at two different sites in the gastrointestinal tract has been documented. Obstructions have occurred in: the splenic flexure (13 cases) transverse colon (1 case); hepatic flexure (1 case); descending colon (1 case); ileum (1 case); jejunum (1 case); and duodenum (5 cases).

2277 HEREDITARY PANCREATITIS. REVIEW AND PRESENTATION OF AN ADDITIONAL KINDRED. *(E.)* Appel, M. F. (Kelsey-Seybold Clin., Houston, Tex.). *Arch. Surg.* 108(1):63-65, 1974.

2278 THE PATHOLOGY OF CHRONIC PANCREATITIS IN CAPE TOWN. *(E.)* Uys, C. J.; Bank, S.; Marks, I. N. (Dept. Pathol., Univ. Cape Town, South Africa). *Digestion* 9(5):454-468, 1973.

2279 CHRONIC PANCREATITIS IN THE WESTERN CAPE. *(E.)* Marks, I. N.; Bank, S.; Louw, J. H. (Groote Schuur Hosp., Cape Town, South Africa). *Digestion* 9(5):447-453, 1973.

2280 A STUDY OF CHRONIC PANCREATITIS IN NATAL. *(E.)* Moshal, M. G. (Gastrointestinal Unit, Univ. Natal, Durban, South Africa). *Digestion* 9(5):438-446, 1973.

2281 CHRONIC PANCREATITIS IN ZURICH, 1963-1972. CLINICAL FINDINGS AND FOLLOW-UP STUDIES OF 102 CASES. *(E.)* Ammann, R. W.; Hammer, B.; Fumagalli, I. (Dept. Intern. Med., Univ. Zurich, Switzerland). *Digestion* 9(5):404-415, 1973.

2282 A REVIEW OF EXPERIMENTAL PANCREATITIS. *(E.)* Schiller, W. R.; Suriyapa, C.; Anderson, M. C. (Med. Coll. Ohio, Toledo). *J. Surg. Res.* 16(1):69-90, 1974.

2283 PANCREATIC PSEUDO-PSEUDOCYSTS. *(E.)* Shafer, R. B.; Silvis, S. E. (Dept. Med., Univ. Minnesota, Minneapolis). *Am. J. Surg.* 127(3):320-325, 1974.

2284 TRIAMCINOLONE-AUGMENTED GLUCOSE TOLERANCE IN NON-DIABETIC PATIENTS WITH CHRONIC PANCREATITIS. *(E.)* Joffe, B. I.; Jackson, W. P. U.; Bank, S. (Witwatersrand Univ. Med. Sch., Johannesburg, South Africa). *Postgrad. Med. J.* 50:25-28, 1974.

2285 CHRONIC PANCREATITIS IN CHILDHOOD ASSOCIATED WITH MUMPS VIRUS INFECTION. *(E.)* Wood, C. B.; Bradbrook, R. A.; Blumgart, L. H. (Welsh Natl. Sch. Med., Cardiff, Wales). *Br. J. Clin. Pract.* 28(2):67-69, 1974.

2286 DELAYED OPERATION OR EMERGENCY PANCREATECTOMY IN THE TREATMENT OF ACUTE PANCREATITIS. *(Ger.)* Fritsch, A.; Mach, K. (Univ. Vienna, Surg. Clin., Austria). *Bruns Beitr. Klin. Chir.* 220(4):413-418, 1973.

2287 SURGICAL TREATMENT OF CHRONIC PANCREATITIS. *(E.)* Way, L. W.; Gadacz, T.; Goldman, L. (Univ. California Sch. Med., San Francisco). *Am. J. Surg.* 127(2):202-209, 1974.

2288 SPONTANEOUS PERFORATION OF THE TRANSVERSE COLON COMPLICATING ACUTE PANCREATITIS: REPORT OF A CASE. *(E.)* Fazio, V.; Cady, B. (Lahey Clin. Fdn., Boston, Mass.). *Dis. Colon Rectum* 17(1):106-108, 1974.

2289 ACUTE HEMORRHAGIC PANCREATITIS IN THE DOG. II. EFFECT OF VASOPRESSIN ON SURVIVAL TIMES. *(E.)* Schapiro, H.; Britt, L. G.; Brooks, J.; Campbell, D.; Blackwell, C. F. (Eastern Virginia Med. Sch., Norfolk). *Am. J. Dig. Dis.* 18(12): 1075-1078, 1973.

2290 FUSIFORM DILATATION OF THE COMMON BILE DUCT WITH PANCREATITIS. *(E.)* Raffensperger, J. G.; Given, G. Z.; Warrner, R. A. (Children's Mem. Hosp. Chicago, Ill.). *J. Pediatr. Surg.* 8(6):907-910, 1973.

2291 DETECTION OF DISORDERS IN ENDOCRINE FUNCTION IN CHRONIC PANCREATITIS. *(Ger.)* Grabner, W.; Phillip, J.; Mayer, A.; Daniel, U.; Matzkies, F. (Med. Clin., Univ. Erlangen, Germany). *Dtsch. Med. Wochenschr.* 99(10):445-448, 1974.

2292 MECHANICAL OBSTRUCTION OF THE DUODENUM CAUSED BY ACUTE PANCREATITIS. *(Sp.)* Solfeto Saez, E.; Ruiperez Polo, S.; Miguel Velasco, J. E.; Lopez Rios, F.; Baron Urbano, C.; Santamaria Garcia, J. L. (La Paz Munic. Sanit., Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(8):907-916, 1973.

2293 CONSERVATIVE TREATMENT OF ACUTE PANCREATITIS. *(Ser.)* Glidzic, V.; Tasic, D.; Milenkovic, M. (Med. Fac., Univ. Belgrad, Yugoslavia). *Srp. Arh. Celok. Lek.* 100(10):1201-1211, 1972.

2294 SOME CLINICAL FEATURES OF THE COURSE OF PANCRETITIS IN CHILDREN. *(Ukr.)* Gudzenko, Zh. P. (Kiev Postgrad. Med. Inst., USSR). *Pediatr. Akush. Ginekol.* 35(5):11-13, 1973.

2295 STRUCTURAL AND FUNCTIONAL FEATURES OF THE LIVER IN PATIENTS WITH CHRONIC PANCREATITIS OF ALCOHOLIC ORIGIN. *(Por.)* Barros, I. B.; Ohki, Y.; Mott, C. de B.; Machado, M. C. C.; Bettarello, A. (Clin. Hosp. Sao Paulo, Brazil). *Arq. Gastroenterol.* 10(4):251-256, 1973.

2296 HEMOBILIA: PANCREATIC PSEUDOCYST HEMORRHAGE DEMONSTRATED BY ENDOSCOPY AND ARTERIOGRAPHY. *(E.)* Brintnall, B. B.; Laidlaw, W. W.; Papp, J. P. (Blodgett Mem. Hosp., Grand Rapids, Mich.). *Am. J. Dig. Dis.* 19(2):186-188, 1974.

See also 1985, 2011, 2265, 2402

97 THE AMINO ACID NAPHTHLAMIDASE REACTION OF
THE BILE CANALICULI IN LIVER SMEARS. *(E.)*
sastjerna, C.; Ekelund, P. (Kivela Hosp., Hel-
nki, Finland). *Acta Cytol.* 18(1):23-29, 1974.

tologic air-dried smears from human, rat and
inea pig livers were stained for amino acid
phthylamidase activity with alanyl-4-methoxy-2-
phthylamide as the substrate. The liver cells
unfixed smears displayed a granular cytoplasmic
action, but no canaliculi were observable. Pre-
eatment with acetone-chloroform, and some other
pid solvents, eliminated the intracellular stain-
g, but it was required for staining of the bile
naliculi. These were visible as uniformly-stained,
rk red bands, about twice the width of those
en by staining for adenosine triphosphatase. The
nalicular amino acid naphthylamidase of air-dried
ver smears was resistent to dry heat and to p-
loromercuribenzoate. The enzyme was completely
hibited by EDTA and Hyamine, and partly by
romycin. The results with leucyl-beta-napthyl-
ide as substrate were similar. Smears of human
le exhibited a strong alkaline phosphatase, a
ak or negative amino acid naphthylamidase reac-
on and no adenosine triphosphatase activity. The
ino acid naphthylamidase staining of liver cell
ears fixed with acetone-chloroform provides a
itable mens for cytologic study of the bile cana-
culi, which is valuable in the diagnosis of
olestasis, hepatitis, and carcinoma.

98 STUDIES OF LIPOPROTEIN-X (LP-X) AND BILE
ACIDS IN FAMILIAL LCAT DEFICIENCY: PRE-
MINARY REPORT. *(E.)* Gjone, E.; Javitt, N. B.;
omhoff, J. P.; Flausa, O. (Univ. Hosp., Rikshosp.,
lo, Norway). *Acta Med. Scand.* 194(5):377-378,
73.

e serum bile acid concentration and composition
re investigated in 5 Norwegian patients with
milial LCAT deficiency and the presence of lipo-
otein-X (LP-X) in their serum was studied. Bile
mposition was studied in 2 of them. LP-X was
monstrated in serum from all 5 patients. All had
evated free cholesterol and markedly reduced con-
ntrations of cholesteryl ester. LCAT activity
s not detected in serum of any of them. Serum
iglycerides were high in all, as were also total
ospholipids. Elevated concentrations of serum
ic acid and acid phosphatasis were found in 3 of
e patients. The serum bile acid studies showed
at all patients had normal total concentration.
ne of the patients had any sign of liver or biliary
act disease. The bile composition as studied in
llbladder bile and duodenal bile respectively,
om 2 patients had a normal composition of bile
ids and lipids. It is concluded that these find-
gs show that factors other than biliary obstruc-
on and serum bile acid accumulation may be respons-
le for the formation of LP-X in serum. The finding
bile acids (particularly lithocholic acid) bound
LP-X in patients with liver disease and high
rum bile acid levels may probably represent a non-
ecific binding.

2299 DELTA-AMINOLEVULINIC ACID DEHYDRATASE ACTIVITY OF ERYTHROCYTES AND LIVER TISSUES IN MAN. RELATIONSHIP TO LEAD EXPOSURE. *(E.)* Secchi, G. C.; Erba, L.; Cambiaghi, G. (Inst. Occupational Health, Univ. Milan, Italy). *Arch. Environ. Health* 28(3):130-132, 1974.

The delta-aminolevulinic acid dehydratase (ALAD) activity of erythrocytes and of liver tissue was studied in 22 subjects not occupationally exposed to lead. A considerable heterogeneity in the levels of ALAD activity of erythrocytes and of blood lead was confirmed in this group of subjects, an expression of the varying degree of absorption of lead that occurs in each individual who is exposed through pollution of the atmosphere and food. In the group of subjects studied, there was a correlation between the values of erythrocyte ALAD activity and the values of ALAD activity of liver tissue.

2300 HEPATIC CELLULAR RESPONSES TO LIVER CANCER: ABNORMALITIES IN METABOLISM OF MITOCHONDRIA ISOLATED FROM HUMAN LIVER INVOLVED WITH CARCINOMA. *(E.)* Ozawa, K.; Kitamura, O.; Yamaoka, Y.; Kamano, T.; Mizukami, T.; Takeda, H.; Takasan, H.; Honjo, I. (Kyoto Univ. Fac. Med., Japan). *Ann. Surg.* 179(1):79-87, 1974.

To clarify the hepatic cellular responses to liver cancer, a biochemical analysis of liver mitochondrial metabolism was made on 44 biopsy specimens of liver with primary and secondary cancer. In the mitochondria from hepatic tissues with multiple nodules scattered throughout both lobes, the concentrations of cytochromes $a(+a_3)$ and b were decreased to less than about 50% of controls and their phosphorylation rates were severely inhibited. The mean survival for those patients surviving the postoperative days was 19 days. On the other hand, in hepatic tissues with massive tumor restricted to one lobe the concentrations of respiratory enzymes and the phosphorylation rates of the mitochondria from the lobe bearing cancer were decreased, while those of the mitochondria from the lobe without cancer were remarkably increased in a compensatory manner. Those patients lived more than 3 months. However, when such an increase in the lobe without cancer could not be demonstrated, those patients had relatively short survival. From the results, it has been suggested that an alteration of hepatic parenchyma around tumor leading to the functional state of depressed aerobic phosphorylation precedes an enhancement of tumor growth and may provide the hepatic soil favorable to enhanced tumor growth and the augmentation of hepatic metastases.

2301 ON THE PATHOLOGICAL MODIFICATION OF SERUM HIGH DENSITY LIPOPROTEINS IN LIVER DISEASES. AN ALTERATION IN THE BINDING MODE OF INDOCYANINE-GREEN WITH HUMAN SERUM PROTEINS. *(E.)* Tanaka, N.; Kanai, K.; Oda, T. (Fac. Med., Univ. Tokyo, Japan). *Clin. Chim. Acta* 49(3):333-340, 1973.

Changes of the binding mode of an anionic dye, indocyanine-green (ICG), with serum proteins in liver diseases are presented. Blood was obtained from patients fasted overnight. A total of 137 sera were investigated, consisting of 12 cases of acute viral hepatitis, 37 of chronic hepatitis, 22 of carbohydrate-induced fatty liver, 34 of liver cirrhosis, and others. In normal subjects, 3 distinct peaks of proteins (19S, 7S, 4S) were observed in gel filtration chromatography. These peaks were also separated in case of ICG (Peak I, II, III). In liver diseases in which no Peak II existed, it did not reappear even when the concentration of ICG was increased. Peak II completely disappeared at the onset of acute virus hepatitis, reappeared slightly in a recovery stage, and returned to normal when the patient completely recovered. Liver cirrhosis and primary hepatoma showed no Peak II. Peak II decreased apparently in most cases of chronic hepatitis. In normal subjects, proteins mainly responsible for ICG binding in Peak I were very low density lipoproteins and low density lipoproteins, in Peak II, high density lipoproteins, and in Peak II, albumin. In liver diseases in which Peak II was not recognized, a high density lipoprotein was found at the 19S site by chromatographic analysis and this high density lipoprotein had the characteristics of an α-lipoprotein electrophoretically. The chromatographic patterns presented in patients with carbohydrate-induced fatty liver were not different from those of normal subjects. The differences in binding changes may be helpful in differentiating carbohydrate-induced fatty liver from other disease of the liver.

2302 AUTORADIOGRAPHIC LOCALIZATION OF INTRACELLULAR α-FOETOPROTEIN IN PRIMARY LIVER CANCER IN MAN.

(E.) Uriel, J.; Loisillier, F.; Szekely, A. M.; Bismuth, H. (Inst. Res. Sci. Cancer, Villejuif, France). *Biomedicine* 21:21-25, 1974.

α-Fetoprotein was localized by cell affinity labeling with tritiated estrogens in a hepatocellular carcinoma from a 31-yr-old man. Tumor biopsy was obtained in the course of abdominal operation. Liver histology showed a multifocal hepatocellular carcinoma with pronounced polymorphism. Areas of well differentiated trabecular hepatoma alternated with large nests of small or giant cells, frequently having a trabecular architecture, and with zones of macronodular cirrhosis probably of postnecrotic origin. After incubation with tritiated estrogens, radiolabelled cells were found in different areas of the tumor section: 1) in zones of bile-duct proliferation in the vicinity of portal tracts; 2) disseminated among neoplastic trabeculae most frequently at the border of sinusoid capillaries or protruding into the lumen; 3) entrapped within areas of fibrous connective tissue together with spindle-cells and cells of ductular morphology. Kupffer cells and cuboidal cells lining bile ducts were devoid of radioactivity. Radioactivity was concentrated in the cytoplasm or at the cytoplasmic membrane of well individualized single or thinly scattered groups of cells. Whatever the site of localization, the morphology of the labeled elements was very similar: small round or oval cells with an elongated or kidney-shaped nucleus. The total number of radiolabelled cells per tumor section was relatively low, about 1 to 2% of the whole liver cell population. The hypothesis is advanced that α-fetoprotein probably is transitorily produced by a transitional cell implicated in liver ontogeny and regeneration.

2303 PRIMARY CARCINOMAS OF THE LIVER IN HONG KONG: SOME POSSIBLE AETIOLOGICAL FACTORS.

(E.) Gibson, J. B.; Chan, W. C. (Dept. Pathol., Univ. Hong Kong). *Recent Results Cancer Res.* 39:107-118, 1972.

Some possible etiological factors concerning primary carcinomas of the liver are discussed. In Hong Kong, about 17% of primary liver cancers are of bile-duct type; however, the ratio of cholangiocarcinoma to liver-cell carcinoma is about the same as in the West. Evidence has been collected which points to the association of intrahepatic-bile-duct carcinoma with oriental distomiasis. The liver fluke responsible for infections is Clonorchis sinensis. In Hong Kong, flukes are found in about 23% of the cases that are over 2 yr of age. Cholangiocarcinoma is diagnosed in Hong Kong almost exclusively in persons over 40 yr of age; it seems that the carcinogenic action of distomiasis works slowly. How clonorchiasis brings about its carcinogenic effect is unknown. Oriental distomiasis is associated with a proliferation of the biliary epithelium, with an enhancement of the mucus secretion and with the new formation of goblet cells in segments of the ducts in the immediate vicinity of the flukes. This type of carcinoma in the liver is often mucin-producing. Cholangiofibrosis presents mucin that is identical in histochemical reactions with that produced normally in the common bile duct of the rat. Therefore, cholangiofibrosis may be a precursor of the bile duct tumors that sometimes occur in place of the more usual hepatocellular tumors in experimental carcinogenesis, and particularly when butter yellow is employed. In Hong Kong, liver-cell carcinoma is commoner than cholangiocarcinoma, and clonorchiasis, schistosomiasis and other forms of parasitism play no demonstrable part in the etiology. In experiments with chemical carcinogens on rats, it is common to find that effective agents can produce either cirrhosis or carcinoma or both. When diethylnitrosamine is given to young male rats, hepatocellular carcinomas are induced within a few months. Cirrhosis in Hong Kong is not very different from that seen in other tropical locations. In the search for a causitive factor in human liver cancer, the heaptotoxic elements in the environment have to be considered. A naturally occurring biological product, pyrrolizidine alkaloids, has attracted considerable attention as a source of chronic liver disease but its importance is still not settled. Another source of hepatotoxic agents is contamination of food by toxigenic fungi, such as *Penicillium Islandicum, Aspergillus Flavus, Fusarium,* and *Rhizopus*. In Southeast Asia, it appears that contamination of foodstuffs with aflatoxins is likely to prove of significance in the etiology of liver cancer.

2304 SPONTANEOUS RUPTURE OF HEPATOMA: A MISDIAGNOSED SURGICAL EMERGENCY. *(E.)*

kezie, O.; DeAngelis, G. (Queens Hosp. Ctr., amaica, N.Y.). *Ann. Surg.* 179(2):133-135, 1974.

hree case reports are presented of spontaneous upture of hepatoma. There are no pathognomonic igns, symptoms, or laboratory indices of hepatoma. he relevant laboratory findings for the 3 patients re: total bilirubin, 0.7, 3, and 1.5; alkaline hosphate, 12.5, 19, and 47; albumin, 3.1, 2.5, and .2; cholesterol, 170 and 153; SGOT, 25, 221, and 5; Prothrombin time, 13.5/13 and 15/14; glucose, 4 and 80; hematocrit, 31%, 44.7-24%, and 28%; and eucocyte, 7,000, 5,700, and 23,000. The disease imics other conditions and rarely presents as an cute abdominal catastrophe. These three patients ere apparently well and all presented with acute bdomen due to the spontaneous rupture of a hepatoma. he unsuspected diagnosis was established at laparoomy. Hepatoma is intimately associated with liver irrhosis and hemochromatosis, and has a prediliction or middle-aged and elderly men. The three cases ere all male, 50, 53, and 65 yr old. Patients 1 nd 2 had cystic lesions, biopsies of which were istologically hepatomas. Patient 3 was not an aloholic, but all 3 demonstrated cirrhosis at biopsy.

305 THE SURGICAL ANATOMY OF THE HEPATIC VEINS: VARIATIONS AND THEIR IMPLICATIONS FOR AUXILARY LOBAR TRANSPLANTATION. *(E.)* Baird, R. A.; ritton, R. C. (no affil.). *J. Sur. Res.* 5(5):345-347, 1973.

n anatomic study of the hepatic veins was undertaken to determine the feasibility of hepatic lobe ransplantation using living donors. Vinylite corroion casts were made of 74 human livers obtained at utopsy. The right lobe was drained by both the ight hepatic vein and the median vein. It was also requently drained by other variously sized veins uch as the dorsal inferior and the dorsolateral ight hepatic veins which enter the vena cava along ts perihepatic length. The left lobe was drained y one or more veins that enter the vena cava either irectly or through a common trunk with the median ein. A common trunk was present in 94% of casts nd varied in length from 2 to 22 mm; the mean length as 10 mm. It most often comprised the confluence f the median and a single left hepatic vein. In 9% f the cases, the inferior segment of the left lobe rained into a peripheral, or distal, branch of the edian vein.

2306 GAMMA-GLUTAMYL TRANSPEPTIDASE IN DISEASES OF THE LIVER AND BONE. *(E.)* Betro, M. G.; Edwards, J. B. (Dunedin Public Hosp., New Zealand). *Am. J. Clin. Pathol.* 60 (5):672-678, 1973.

2307 BENIGN RECURRENT CHOLESTASIS. *(E.)* Beaudoin, M.; Feldmann, G.; Erlinger, S.; Benhamou, J. P. (Hosp. Beaujon, Clichy, France). *Digestion* 9(1):49-65, 1973.

2308 HEPATIC ENCEPHALOPATHY: CURRENT STATUS. *(E.)* Schenker, S.; Breen, K. J.; Hoyumpa, A. M., Jr. (Vanderbilt Univ. Med. Sch., Nashville, Tenn.). *Gastroenterology* 66(1):121-151, 1974.

2309 ACUTE HEPATIC NECROSIS AND FULMINANT HEPATIC FAILURE. *(E.)* Rueff, B.; Benhamou, J. P. (Hosp. Beaujon, Clichy, France). *Gut* 14(10):805-815, 1973.

2310 TUMOURS OF LIVER, BILIARY SYSTEM AND PANCREAS. *(E.)* Hutt, M. S. R.; Anthony, P. P. (no affil.). *Recent Results Cancer Res.* 41:57-78, 1973.

2311 LIVER-CELL NEOPLASMS AND ORAL CONTRACEPTIVES. *(E.)* Lingeman, C. H. (Natl. Cancer Inst., NIH, Bethesda, Md.). *Lancet* 1(7846):64, 1974.

2312 RECENT TECHNIQUES AND HYPOTHESES IN THE EPIDEMIOLOGY OF LIVER CANCER. *(E.)* Tuyns, A. J. (Int. Agency Res. Cancer, Lyon, France). *Recent Results Cancer Res.* 39:119-124, 1972.

2313 IN SEARCH OF A HEPATIC OSMORECEPTOR IN MAN. *(E.)* Bennett, W. M.; Hennes, D.; Elliot, D.; Porter, G. A. (Univ. Oregon Med. Sch., Portland). *Am. J. Dig. Dis.* 19(2):143-148, 1974.

See also 1631, 1760, 1763, 1765, 1800, 1866, 1950, 1960, 1969, 1986, 1989, 1991, 1996, 1997, 1998, 2000, 2009, 2010, 2013, 2018, 2019, 2034, 2036, 2068, 2095, 2131, 2290, 2297, 2314, 2380, 2386, 2409, 2524, 2525, 2534, 2537, 2538, 2541, 2542, 2544, 2546.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

314 HEPATIC CLEARANCE OF UNCONJUGATED BILIRUBIN IN CHOLESTATIC LIVER DISEASES. *(E.)* loomer, J. R.; Berk, P. D.; Howe, R. B. (Yale Univ. ch. Med., New Haven, Conn.). *Am. J. Dig. Dis.* (1):9-14, 1974.

e hepatic clearance of unconjugated ^{14}C-bilirubin om the plasma of 5 patients with cholestatic liver disease was normal when compared with values obtained in 28 healthy young adults. In 1 patient with benign recurrent cholestasis, clearance was the same during an attack of cholestasis (serum bilirubin concentration 25.7 mg/100 ml) as when the patient was in remission (serum bilirubin concentration 0.65 mg/100 ml). This study indicates that factors other than abnormal hepatic function should be considered with a patient with predominantly cholestatic liver disease manifests an increased plasma concentration of unconjugated bilirubin. Shortened red-cell life spans in 2 patients (20 and 16 days, Resp.) suggest that increased bilirubin production due to red cell hemolysis may contribute to the unconjugated hyperbilirubinemia. Increased bilirubin production in cholestatic patients could also be due to enhanced turnover of hepatic heme compounds, since hypertrophy of the hepatic smooth endoplasmic reticulum occurs in the cholestatic animal. In some cases, elevations in the indirect-reacting fraction of unconjugated bilirubin may reflect an artifact of methodology.

2315 MATERNAL HYPERBILIRUBINEMIA AND THE NEWBORN. *(E.)* Lipsitz, P. J.; Flaxman, L. M.; Tartow, L. R.; Malek, B. K. (Beth Israel Med. Ctr., New York, N.Y.). *Am. J. Dis. Child.* 126:525-527, 1973.

This report describes the effect of severe maternal hyperbilirubinemia (total bilirubin value, 40 mg/100 ml, of which about 30 to 40% was unconjugated) on the fetus for 3 weeks prior to delivery. Maternal history included sickle-cell disease. The newborn at delivery had a value of 9.8 ml/100 ml for cord blood unconjugated bilirubin (total bilirubin value, 10.4 mg/100 ml; conjugated, 0.6 mg/100 ml) which was similar to the maternal serum value of 11.0 mg/100 ml on the day of delivery. This phenomenon may indicate maternal to fetal transfer of unconjugated bilirubin. It is suggested that equilibration of fetal and maternal circulation of unconjugated bilirubin may occur. However, it is also possible that the elevated unconjugated bilirubin concentration in the maternal blood may have restricted transfer of fetal bilirubin across the placenta. The newborn developed hyperbilirubinemia for which exchange transfusions were required. He also manifested *Escherichia coli* septicemia and expired 46 hr after birth as a result of infection. The autopsy findings revealed no evidence of bilirubin encephalopathy. The hyperbilirubinemia in the infant was likely due either to prematurity, bacterial sepsis, or both.

2316 EVALUATION OF HEPATOTOXICITY OF A DRUG IN PRISON INMATES. *(E.)* Cucinell, S. A. (Walter Reed Army Inst. Res., Washington, D.C.). *J. Clin. Pharmacol.* 14(1):58-60, 1974.

The abnormalities observed during the course of experiments with prison inmates may be due to the prevalence of hepatitis. Fifty-eight men volunteered for the study of the antimalarial drug 4,4'-sulfonylbisformanilide (DPD). Thirteen had elevations of the SGOT, alkaline phosphatase, or both and were not accepted. Only 2 applicants gave a history of hepatitis. However, 20% of the men admitted a history of drug use. There was no relationship between a history of drug use and abnormal liver function tests among the men accepted for the study. There was no tendency for the alkaline phosphatase to rise during the drug treatment period. The SGOT also tended to be high in most volunteers, but only applicants with an initial level under 40 U/ml were placed on the test. Four individuals of the 45 under study had elevations of SGOT during the study. In one man, DFD was stopped. Two others were receiving only placebo, and the fourth man was continued on DFD. The SGOT returned to normal in all. The 4 men who had an elevation of SGOT while on the study admitted drug use in the past. The 4 individuals with elevation of SGOT during the test had no comparable increase in alkaline phosphatase. The abnormalities observed may be due to the prevalence of hepatitis.

2317 BILIRUBIN METABOLISM AND INHERITABLE JAUNDICE. *(E.)* Arias, I. M. (Albert Einstein Coll. Med., New York, N.Y.). *Isr. J. Med. Sci.* 9(9-10):1419-1426, 1973.

2318 FIFTY COMMON DISEASES WITH ELEVATIONS OR DECREASES IN TOTAL SERUM BILIRUBIN. *(E.)* Casey, A. E.; Downey, E. L.; Copeland, H. (Mem. Inst. Pathol., Birmingham, Ala.). *Ala. J. Med. Sci.* 10(3):305-307, 1973.

See also 1748, 1772, 1795.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

2319 CHOLESTATIC NON-ANGIOCOLITIC HEPATITIS WITH XANTHOMATOSIS, AND CIRRHOSIS. *(Fr.)* Caroli, J.; Nusinovici, V.; Ben Amar, A.; Levy, V. G. (St. Antoine Hosp., Paris, France). *Ann. Med. Interne (Paris)* 124(11):761-770, 1973.

During an epidemic of cholestatic hepatitis, 6 of 50 patients developed periportal fibrosis, severe hyperlipemia, and xanthomatosis. Of these 6 patients, all were women and 5 were aged 40-50 yr. This form of hepatitis was associated with drugs (estrogen-pro-

estagen, antitussive agent, unspecified i.v. in-
ections in 3 cases. None of the patients had a
istory of pruritis or Australia or antimitochondrial
ntibodies. The liver became enlarged only after
-12 months and xanthomatosis, which varied greatly
n its severity, developed after 7-14 months. Jaun-
ice regressed spontaneously or after therapy in all
ases. Other signs included melanoderma, regressive
scites, finger clubbing, and cancer of the thyroid
ith xanthomatosis of metastatic lymph nodes (1 case
ach). Serum bilirubin values ranged from 20.1 to
.0 mg/100 ml and total lipids, from 36 to 75 g/li-
er. Serum bilirubin values reached a maximum af-
er 8-10 months and blood lipids, somewhat later.
ipoprotein X was detected only when blood lipid
evels were greater than 15 g/liter. Biliary tract
bstructions were ruled out at laparotomy in all
ases. Liver biopsies showed that the initial lesion
onsisted of massive cholestasis with obliteration
f intralobular bile ducts in the portal spaces.
eriportal fibrosis developed after 4 months and,
n 2 cases, was preceded by necrosis. This fibro-
is remained mild in 2 cases, but became progressive-
y more severe and tended to dissect the lobule in
he 4 remaining patients. Prolonged administration
f phenobarbital (initial dose of 6-10 mg/kg) to
 of these patients relieved the pruritis, jaundice,
nd reduced blood lipid levels; 3 of these patients
eveloped side effects. Glutethimide (15 mg/kg),
iven to 3 patients, reduced blood lipid levels but
ad no effect on pruritis. External bile drainage
3 cases), corticosteroids (1 case), and long courses
f cholestyramine (6 cases), which are effective
gainst less severe forms of cholestatic jaundice,
aused no improvement in patients with this form of
holestatic hepatitis.

320 ASPIRIN HEPATITIS. *(E.)* Wolfe, J. D.;
Metzger, A. L.; Goldstein, R. C. (Univ.
alifornia Med. Ctr., Los Angeles). *Ann. Intern.
ed.* 80(1):74-76, 1974.

 20-yr-old woman with systemic lupus erythematosus
eveloped hepatitis while on high-dose aspirin thera-
y (975 mg every 4 hr, for a total of 4.8 g/day). Liver
unction tests showed SGOT was 360 IU/ml; SGPT, 168
U/ml; and alkaline phosphatase, 197 IU/liter. The
erum salicylate level was 45 mg/100 ml. Liver func-
ion returned to normal when aspirin therapy was
iscontinued. Subsequent rechallenge with aspirin
4.8 g/day) resulted in hepatitis. SGOT and SGPT
ere 670 and 300 IU/ml, resp., and alkaline phospha-
ase was 205 IU/liter. Serum salicylate was 31 mg/
00 ml. Microscopic examination showed focal hepa-
ocellular necrosis and mild portal, lobular, and
entrolobular infiltration with neutrophils, lympho-
ytes, plasma cells, and histiocytes. There was no
vidence of chronic liver disease or vasculitis.
ince the exact frequency, susceptible population,
nd pathogenetic mechanism of salicylate-induced
epatotoxicity are unknown, serum salicylate levels
nd liver function should be monitored in patients
n high-dose salicylate therapy.

321 DISORDERED HEMOSTASIS IN LIVER DAMAGE FROM PARACETAMOL OVERDOSE. *(E.)* Clark, R.; Borirakchanyavat, V.; Gazzard, B. G.; Rake, M. O.; Shilkin, K. B.; Flute, P. T.; Williams, R. (King's Coll. Hosp. Med. Sch., London, England). *Gastroenterology* 65(5):788-795, 1973.

Coagulation disturbance and radioactive fibrogen turnover were studied in 36 patients (aged 15-58 yr) with hepatic damage due to an overdose of acetaminophen (13-50 g). Based on maximum serum bilirubin value, the patients were divided into 3 groups (A, B, and C) representing mild, moderate and severe liver injury. Group A patients had ← 1 mg serum bilirubin/100 ml; group B, 1-4 mg/100 ml; and group C, → 4 mg/100 ml. Prothrombin time was significantly abnormal in group A, but the greatest change occurred in group C patients. Partial thromboplastin time was markedly prolonged only in the C group. Individual clotting factors, assayed in 9 patients, fell in order of their half-lives. Mean values for thrombin clotting time were prolonged only in group C, in which mean plasma fibrogen values were below normal. Fibrogen-fibrin degradation products were within normal range in group A, increased in half of the B group patients, and most frequently present in C group patients. Plasma half-life of ^{125}I-fibrogen was decreased in 8 of 12 cases studied, indicating an increased rate of disappearance from the circulation. Fibrogen synthesis was normal in 3 cases tested in group A and increased in 4 of 6 cases from groups B and C. These results indicate a positive relation between the severity of liver disease and the degree of coagulation abnormality. However, the changed pattern of coagulation disturbance with increasing hepatic damage suggests that intravascular coagulation is also present. This intravascular coagulation is implicated in increased loss of fibrogen.

2322 ENZYME PATTERNS REFLECTING HEPATIC RESPONSE TO ANESTHESIA AND OPERATION. *(E.)* Thompson, D. S.; Greifenstein, F. E. (VA Hosp., Little Rock, Ark.). *South. Med. J.* 67(1):69-74, 1974.

SGPT, SGOT, and serum ornithine carbamoyl transferase (SOCT) determinations were carried out in 159 men (aged 23-78 yr) before and after operations involving various anesthetic agents and different sites. SGPT values increased significantly on all days following operations in the upper abdomen, and on postoperative day 7 following operations at sites other than the upper abdomen. SGPT increases were greatest following halothane and methoxyflurane. Although differences between these agents were not significant, the only extreme SGPT elevations were associated with halothane anesthetics. These occurred on day 7 following vagotomy and pyloroplasty and on day 7 following a cervical fusion. Enzyme elevation associated with spinal anesthesia occurred after an inguinal herniorraphy and 2 transurethral prostatic resections. No SGPT value exceeded the normal range following cyclopropane anesthesia. There was good agreement between SGPT values measured colorimetrically and those determined by the ultraviolet or spectrophotometric method. SGPT values correlated positively with SGOT and SOCT, indicating that SGPT is a reliable indicator of hepatocellular damage in the postoperative period. Higher enzyme values associated with halogenated hydrocarbons may be due to unknown metabolites.

2323 ASPIRIN-INDUCED HEPATOTOXICITY IN PATIENTS WITH SYSTEMIC LUPUS ERYTHEMATOSUS. *(E.)*

Seaman, W. E.; Ishak, K. G.; Plotz, P. H. (Natl. Inst. Health, Bethesda, Md.). *Ann. Intern. Med.* 80(1):1-8, 1974.

Patients (3 females, aged 19-29 yr) with systemic lupus erythematosus had liver injury related to aspirin therapy, 2-4 g/day over 1-8 months. The extent of liver damage in these cases was dose-related and improvement was noted on cesation of aspirin intake even before salicylate levels returned to normal, thus ruling out the possibility of an allergic reaction. In 2 patients, the initial presentation mimicked chronic active hepatitis. A liver biopsy obtained from 1 patient was also consistent with the diagnosis of chronic active hepatitis, and the biopsy from the second showed acute hepatocellular injury. In 2 patients SGOT and SGPT values increased, and in the third the alkaline phosphatase value increased as well. Aspirin should be considered among causes of hepatitis, particularly in patients with lupus erythematosus. Aspirin challenge was offered in each of these cases and it is suggested that this be done whenever the diagnosis is in doubt. Any abnormalities occurring in liver functions as a result of this challenge will normalize on drug withdrawal.

2324 RICKETTSIAL HEPATITIS IN "Q" FEVER.

Dragomirescu, M.; Popian, R.; Martincu, V. (Med. Inst. Timisoara, Rumania). *Med. Interna* 25(2):225-228, 1973.

See also 1762.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

2325 FULMINANT HERPESVIRUS HOMINIS HEPATITIS DURING PREGNANCY. *(E.)*

Goyette, R. E.; Donowho, Jr., E. M.; Hieger, L. R.; Plunkett, G. D. (Brooke Gen. Hosp., Fort Sam Houston, Tex.). *Obstet. Gynecol.* 43(2):191-196, 1973.

Following exposure to her 2-yr-old son with herpetic gingivostomatitis, a 23-yr-old woman in the 28th week of pregnancy developed *Herpesvirus hominis* (herpes simplex virus) hepatitis and died 2 weeks later. Previous physical examination had revealed an injected pharnyx with multiple ulcerations. Laboratory findings on admission included a hematocrit of 25%; WBC of 13,500, with 66% mature polymorphonuclear leukocytes, 24% mature lymphocytes, and 4% nucleated red blood cells. Serum electrolytes were sodium, 138 mEq/liter; potassium, 5.6 mEq/liter; chloride, 105 mEq/liter; and carbon dioxide, 22 mM/liter. Diagnosis was hyperventilation syndrome. Postmortem findings were morphologically and serologically characteristic of acute herpetic hepatitis. The yellow-tan liver was dotted with circular hemorrhagic rings. The parenchyma within the rings was soft and necrotic. Hepatocytes bordering focal areas of necrosis and hemorrhage contained enlarged nuclei, many with Cowdry Type A inclusion bodies. Viral particles within hepatocytes had an electron dense core surrounded by both single and double membranes. Tissue homogenates produced partial cell destruction in human embryonic kidney 24 hr after inoculation; similar changes were seen in other cultures on the 4th day. The viral isolate from postmortem material was typed by neutralization using *Herpesvirus hominis* hyperimmune guinea pig sera. The specimen was then subtyped as Type I using specific sera. Studies with the median tissue culture infective dose of the maternal virus showed the 2-yr-old son had a neutralizing titer of 1:20 in subacute serum and 1:160 in 5-week convalescent serum. Only 2 other documented cases of *Herpesvirus hominis* in otherwise healthy adults are reported in the English literature; one of these was a 39-yr-old male and the other a young woman in the 28th week of pregnancy. Depressed immunoglobulin levels may contribute to the occurrence of this entity in the 3rd trimester of pregnancy. With the advent of effective chemotherapy (cytosine arabinoside), the diagnosis should be strongly considered in pregnant women with pharyngeal ulceration and systemic symptoms.

2326 DETECTION OF AUSTRALIA ANTIGEN IN LIVER BIOPSIES BY IMMUNOFLUORESCENCE. *(E.)*

Cerat, G.; Richer, G.; Viallet, A.; Cote, J.; Robert, J.; Turgeon, F. (St. Luke Hosp., Montreal, Canada). *Can. Med. Assoc. J.* 108(8):981-984, 1973.

A search for Australia antigen was made by immunofluorescence in 105 liver biopsies obtained from the same number of patients. No specific fluorescence was observed in 38 cases of acute viral hepatitis (19 of them seropositive for Australia antigen) or in 55 seronegative patients with various liver disorders including alcoholic hepatitis (9), micronodular cirrhosis (14), alcoholic hepatitis with cirrhosis (10), metastases to liver (4), nonspecific focal hepatitis (4) and hepatic steatosis (3), or in 8 seronegative patients with histologically normal livers. However, specific fluorescence was seen in 2 cases; in the single case of chronic aggressive hepatitis seropositive for Australia antigen and in 1 of 3 cases of chronic persistent hepatitis with Australia antigen-positive sera. The fluorescence observed was mainly intranuclear when cellular suspensions were used, but cytoplasmic fluorescence was more prominent when observations were made on cryostat sections. The finding of Australia antigen by immunofluorescence in liver

lls in chronic but not in acute forms of hepatitis
ropositive for Australia antigen is consistent
th the hypothesis that Australia antigen-positive
ute or chronic hepatitis may be an indication of
e cellular immune response of the host against
ver cells infected with hepatitis B virus.

27 IN VITRO TRANSFER OF CELL-MEDIATED IMMUNITY TO HEPATITIS B ANTIGEN WITH RNA.

.) Vyas, G. N.; Ibrahim, A. B.; Rao, K. R.;
hite, V. (Dept. Clin. Pathol. Lab. Med., Univ.
lifornia, San Francisco). *Nature* 247(5440):377-
3, 1974.

vitro transfer of cell-mediated immunity to
nimmune cells was demonstrated by inhibition of
gration in the presence of hepatitis B antigen
BAg), using RNA extracted from lymphoid tissue
Hartley guinea pigs immunized with HBAg. For
gration inhibition assays, 0.5 ml of medium con-
ining 7 x 10^7 peritoneal exudate cells from a
rmal guinea pig was incubated at 37 C for 30 min
th 0.5 ml solution of RNA from HBAg-immunized
imals (IRNA). The IRNA clearly and repeatedly
hibited migration of peritoneal macrophages in
e presence of HBAg. RNA from animals immunized
th complete Freund's adjuvant (NRNA) did not in-
bit migration in the presence of HBAg. Macrophage
gration in the absence of HBAg was unaffected by
eatment of cells with IRNA or NRNA. The ability
IRNA to transfer cellular immunity was destroyed
treatment with protease-free RNase. The results
ggest that experimental transfer of cell-mediated
munity to HBAg with IRNA is a specific phenomenon
duced by nondialyzable RNA extracts of lymphoid
gans of guinea pigs immunized against HBA.

28 EVIDENCE AGAINST RECESSIVE INHERITANCE OF SUSCEPTIBILITY TO THE CHRONIC CARRIER TE FOR HEPATITIS B ANTIGEN.

(E.) Vyas, G. N.
iv. California Sch. Med., San Francisco).
ure 248(5444):159-160, 1974.

hinese family consisting of 2 hepatitis B anti-
(HBAg) carrier parents and 3 children was tested
HBAg and anti-HBAg. HBAg was consistently de-
ted in the serum of both immigrant parents over
-month period. Clinical and biochemical results
ggested absence of liver abnormality in the par-
s, who were concluded to be asymptomatic chronic
riers. The 3 children were negative for HBAg
repeated testing of their sera by every method
luding radioimmunoassay. However, the 10-yr-
son had specific anti-HBAg with a titer of 256
hemagglutination assay. The 5-yr-old daughter
3-yr-old son had no antibodies. The fact that
e elder boy did not become a chronic carrier after
osure to HBAg but produced an immune response in
e form of antibody production is evidence that sus-
tibility to the chronic carrier state is not in-
ited as a simple autosomal recessive trait. A
ily clustering of HBAg-positive individuals is
e likely a function of increased opportunity
environmental exposure to the infectious agent.

2329 POSTNATAL CYTOMEGALOVIRUS HEPATITIS. AN AUTOPSY AND LIVER BIOPSY STUDY. *(E.)*

Henson, D. E.; Grimley, P. M.; Strano, A. J. (Natl. Cancer Inst., Bethesda, Md.). *Hum. Pathol.* 5(1):93-103, 1974.

Cytomegalovirus hepatitis was studied in 13 patients (aged 2-66 yr, mean 26.9 yr); 11 had died during disseminated cytomegalovirus infection and 2 had liver biopsies for suspected hepatitis. Of these 2 patients 1 was a 17-yr-old boy with acute lymphocytic leukemia and the other was a 41-yr-old woman with a myeloproliferative disorder. Histologically, inclusions were present in liver cells of all 3 lobular zones and less frequently in the vascular endothelium of the portal areas. Infected liver cells were seen in the cords, partially extruded into sinusoids, or within sinusoids where they were surrounded by inflammatory cells that formed small focal lesions. Once surrounded, infected cells degenerated into acidophilic bodies. In portal areas in which inclusions were seen there was a variable infiltration of acute and chronic inflammatory cells. The number of infected cells varied considerably in the livers from different patients. In the 2 patients with liver biopsies, SGOT, SGPT, and alkaline phosphatase activities were transiently increased. Serological studies in these 2 patients showed high titers of cytomegalovirus complement-fixing antibody. The results indicate that cytomegalovirus hepatitis is characterized by a focal mononuclear cell infiltration in the lobules and a pleomorphic cell infiltration in the portal areas. The lesions associated with virus-infected cells are not diagnostic except when intranuclear inclusions are seen. The histological lesions of biopsy proved cytomegalovirus hepatitis resemble the changes seen in livers of patients dying with hepatic involvement during disseminated infection.

2330 DISSEMINATED INTRAVASCULAR COAGULATION ASSOCIATED WITH HEPATITIS IN LATE PREGNANCY. *(E.)*

Jones, C. T. A.; Birch, C. R.; Poller, L.; Dymock, I. W. (Univ. Hosp. South Manchester, England). *Gut* 14(11):891-894, 1973.

A 36-yr-old patient with viral hepatitis in the 3rd trimester of pregnancy is described. She developed grade II-III hepatic coma in the postpartum period which was associated with evidence of intravascular coagulation, including depression of fibrogen levels, absence of normal puerperal elevation of the platelet count, and gross increase in fibrin breakdown products (307-1249 μg/ml). Serum bilirubin was 9.7 mg%; serum alkaline phosphatase, 41 King-Armstrong U/100 ml; and SGPT, 69 U/ml. Following therapy with heparain (1000-1500 U/hr) and fresh frozen plasma (1 U every 12 hr), the patient improved dramatically. At time of discharge on the 15th day after delivery she was asymptomatic. The infant was well throughout and at 6 months continues to have normal liver function tests with a negative HBAg test. It is suggested that intravascular coagulation in this case followed release of tissue thromboplastins during hepatocellular necrosis with a component contribution from the placental site.

2331 IMMUNOLOGICAL AND ELECTRON MICROSCOPE DETECTION OF AUSTRALIA ANTIGEN (HEPATITIS B ANTIGEN) IN STOOL AND URINE SAMPLES FROM PATIENTS WITH VIRAL HEPATITIS B. *(Ger.)* Sonnabend, W.; Kistler, G. S.; Krech, U.; Jung, M.; Uberschlag, M. L. (St. Gallen Cantonal Inst. Bacteriol., Switzerland). *Schweiz. Med. Wochenschr.* 102(42):1503-1508, 1972.

A modified immunodiffusion technique was used to test for Australia antigen (AuAg) in blood, urine, and stool samples from 86 Au Ag-positive patients with acute serum hepatitis, 12 Au Ag-positive patients with chronic persistent or chronic aggressive hepatitis, and 4 Au Ag-positive patients with cirrhosis and in urine and stool samples from controls with acute gastrointestinal infections or acute or chronic urinary infections. Among patients with acute or chronic urinary infections. Among patients with acute serum hepatitis, Au Ag was detected in 67 of 99 stool specimens (67.7%) and in 32 of 75 urine samples (42.7%). Au Ag was also detected in 6 of 13 stool samples (46.1%) and 3 of 6 urine specimens from patients with chronic hepatitis, and in 3 of 4 stool samples and 1 of 2 urine specimens from patients with cirrhosis. Au Ag was not found in any urine or stool samples from controls. Electron microscope examination of precipitation lines from immunodiffusion plates obtained from 13 stool and 9 urine specimens revealed the presence of immune complexes consisting almost entirely of particles averaging 200 Å in diameter with a few having diameters of about 300 Å. No Dane particles were found. It is concluded that these immune complexes are identical to Au Ag present in blood samples. Until completely reliable methods are developed to detect the infectious agent in a body fluid, it should be assumed that blood, urine, or stool samples containing Au Ag are potentially infectious.

2332 HEPATITIS B. A STUDY OF 200 CASES POSITIVE FOR THE HEPATITIS B ANTIGEN. *(E.)* Lewis, J. H.; Brandon, J. M.; Gorenc, T. J.; Maxwell, N. G. (Sch. Med., Univ. Pittsburgh, Pa.). *Am. J. Dig. Dis.* 18(11):921-929, 1973.

2333 THE EMERGING EPIDEMIOLOGY OF HEPATITIS B ANTIGEN. *(E.)* Cherubin, C. E.; Szmuness, W. (New York Med. Coll., New York). *Ann. Intern. Med.* 79(5):745-746, 1973.

2334 SUBTYPES OF HEPATITIS B ANTIGEN: CLINICAL RELEVANCE? *(E.)* LeBouvier, G. L. (Yale Univ. Sch. Med., New Haven, Conn.). *Ann. Intern. Med.* 79(6):894-897, 1973.

2335 PHARMACOKINETICS OF GLYMIDINE (GLYCODIAZINE) AND TOLBUTAMIDE IN ACUTE AND CHRONIC LIVER DISEASES. *(Ger.)* Held, H.; Eisert, R.; Von Oldershausen, H. F. (Med. Univ. Clin., Tubingen, Germany). *Arzneim. Forsch.* 23(12):1801-1807, 1973.

2336 THE NATURAL HISTORY OF VIRUS (LONG INCUBATION) HEPATITIS. *(E.)* Sherlock, S. (Roy. Free Hosp., London, England). *Rendic. Gastroenterol.* 5(2):107-121, 1973.

2337 ENZYMATIC AND IMMUNOHISTOCHEMICAL FINDINGS IN ACUTE AND CHRONIC HEPATITIS. *(Ger.)* Petzold, H.; Storch, W.; Tauchnitz, C. (Med. Clin., Karl Marx Univ., Leipzig, Germany). *Z. Gesamte Inn. Med.* 28(17):265-267, 1973.

2338 HEPATITIS-B ANTIGEN: IMMUNOLOGICAL RELATIONSHIP TO LP-X, THE ABNORMAL PLASMA-LIPOPROTEIN OF OBSTRUCTIVE JAUNDICE. *(E.)* Neurath, A. R.; Prince, A. M.; Lippin, A.; Chen, M. (New York Blood Ctr., New York, N.Y.). *Lancet* (7842):1394-1395, 1973.

2339 AUSTRALIA ANTIGEN AND INHERITED SUSCEPTIBILITY TO DISEASE. *(E.)* Blumberg, B. S. (Inst. Cancer Res., Philadelphia, Pa.). *Isr. J. Med. Sci.* 9(9-10):1437-1443, 1973.

2340 SUBTYPES OF HEPATITIS B ANTIGEN AMONG ISRAELI BLOOD DONORS. *(E.)* Bar Shany, S.; Edwards, V. M.; Mosley, J. W.; Bancroft, W. H. (Central Blood Bank, Magen David Adom, Tel Aviv, Israel). *Vox Sang.* 25(2):105-112, 1973.

2341 BEHAVIOUR OF THE ARGINASE AND ORNITHINE-CARBAMYL-TRANSFERASE ENZYMES OF THE UREAL CYCLE IN ACUTE HEPATITIS AND OBSTRUCTIVE JAUNDICES. SPECIAL STUDY OF CHRONIC HEPATITIS. *(E.)* Rodriguez Cuartero, A.; Villegas, A. L.; Mora Lara, R. J.; Pelaez Redondo, J. (Dept. Pathol. Med., Univ. Granada, Spain). *Med. Clin.* 60(3):153-159, 1973.

2342 GLYCOPROTEINS ASSOCIATED WITH HEPATITIS B ANTIGEN. *(E.)* Chairez, R.; Steiner, S.; Melnick, J. L.; Dressman, G. R. (Baylor Coll. Med., Houston, Tex.). *Intervirology* 1(3):224-228, 1973.

2343 HEPATITIS B ANTIGEN-POSITIVE HEPATITIS IN AN ISRAELI FAMILY. *(E.)* Alkan, W. J.; Swartz, T. A.; Mundel, G.; Eshchar, J.; Hirshfeld, T.; Versano, D. (Asaf Harofe Govt. Hosp., Zerifin, Israel). *Isr. J. Med. Sci.* 9(11-12):1542-1546, 1973.

See also 1965, 1993, 2016, 2035, 2309, 2372, 2541.

Chronic Hepatitis

344 CHRONIC HEPATITIS IN CHILDREN. *(E.)*
Alagille, D.; Gautier, M.; Herouin, C.;
adchouel, M. (Parrot Hosp., Bicetre, France).
cta Paediatr. Scand. 62(6):566-570, 1973.

istologic findings showed only 16 cases of chronic
epatitis among 35 children originally diagnosed as
aving the disease. Of the 16 cases, 3 had per-
istent nonaggressive hepatitis, 6 chronic active
epatitis of mild intensity (type *a*), and 7 chronic
ggressive hepatitis of severe intensity (type *b*).
n chronic persistent hepatitis, lobular architec-
ure was preserved and portal infiltration and
ortal fibrosis were moderate. There was no piece-
eal necrosis. Type 2 *a* aggressive hepatitis was
ifferentiated on the basis of moderate piecemeal
ecrosis with unclear lobular-portal junction.
ortal fibrosis and inflammatory portal infiltra-
ion were moderate; lobular architecture was nor-
al or little changed. Type 2 *b* aggressive hepatitis
as characterized by profound changes in lobular
rchitecture and severe piecemeal necrosis, portal
nflammatory infiltration, and portal fibrosis. As
reviously reported, there was a prevalence of fe-
ales with chronic hepatitis (12 girls *versus* 4
oys). Pooled data show that incidence increases
rom 2 to 15 yr. Only 4 of the 16 children had a
istory of acute hepatitis; and only 4 of 9 tested
ere positive for Australia antigen. In contrast
o the benign evolution of persistent nonactive
epatitis, chronic aggressive hepatitis shows acute
apid evolution. Control studies demonstrate a
onger survival under corticosteroid therapy, pro-
ided treatment is given during the 1st year of the
isease.

45 A CASE OF ACTIVE CHRONIC HEPATITIS WITH
PAINLESS EROSIVE ARTHRITIS. *(E.)*
rnardo, D. E.; Vernon-Roberts, B.; Currey, H. L.
(Queen Mary's Hosp., London, England). *Gut*
(10):800-804, 1973.

thritis appeared in a 21-yr-old girl 4 yr after
e diagnosis of active chronic hepatitis with
rrhosis. Neither Australia antigen nor epidemic
epatitis-associated Milan antigen was present in
r serum, and tests for serum DNA antibodies and
mplement degradation products were negative.
wever, serial determinations of the C_3 and CH_{50}
actions of serum complement have given persistently
w values. The arthropathy was limited to small
ints of the hands and feet; despite marked soft
ssue swelling, the range of movements was full
d painless. Radiographs of the affected joints
owed destructive and erosive changes with some
riosteal new bone formation. Open biopsy, car-
ed out on the right middle proximal interphalan-
al joint, showed a grossly thickened and edematous
novium. Light microscopy revealed abundant
brinoid material on and within the surface synovial
yer, replacing it in many cases. Electron micro-
opy showed abundant noncollagenous dense fila-
ntous material and scattered collagen fibers in
e surface fibrinoid. Immunofluorescence revealed
undance of IgG in the surface fibrinoid together with small amounts of IgM and a moderate amount of C_3 complement. The arthritis persisted for 10 months, then resolved spontaneously. The synovial appearance would suggest the deposition of immune complexes during the acute arthritis. However, the failure to detect complement degradation products after the arthritis had settled and the consistently subnormal serumcomplement levels indicate impaired hepatic synthesis at the present time, rather than increased consumption of complement.

2346 IMPORTANCE OF THE PROGNOSIS IN THE STUDY OF CHRONIC HEPATITIS: RESULTS OBTAINED WITH IMMUNOSUPPRESSANTS. *(Sp.)* Aguilar Reina, J.; de la Santa, J.; Andreu Kern, F. (Virgen del Rocio Munic. Sanit., Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(3):243-254, 1973.

Clinical, laboratory, and radiological findings were studied in 23 patients (16 men and 7 women; mean age 35.3 yr) with chronic hepatitis to determine which factors might be useful in establishing a prognosis. No relation was found between the later course of the hepatitis and age, sex, a history of acute hepatitis, or the severity of acute hepatitis. In 3 of the 10 patients who eventually developed aggressive hepatitis or cirrhosis there was jaundice and diseases or habits which contributed to metabolic changes (diabetes, alcoholism, postgastrectomy steatorrhea). Liver biopsies proved to be the most useful tool for establishing a prognosis, the most significant changes being piece-meal necrosis, loss of the outlines of hepatic lobules, and parenchymal fibrosis. The course was downhill in all cases in which biopsy findings were consistent with chronic aggressive hepatitis. All patients whose condition later deteriorated initially had significant increases in IgG levels which were associated with increased IgM levels in 6 cases and increased IgA levels in 2. Australia antigen, present initially in 3 patients, later became negative. Although laparoscopy was useful in daignosing cirrhosis, which could not be detected by biopsy in all cases, it was not helpful in establishing a prognosis. Except for the lupus erythematosus phenomenon, which was found in 1 patient, none of the other parameters studied (liver function tests, antinuclear factor, rheumatoid factor, antithyroid antibodies, complement (C-3), Mantoux test, BSP clearance, liver blood flow, scintillation scanning) contributed to the establishment of a prognosis. Therapy consisted of lipotropic agents (unspecified) in 14 patients with initially normal immunoglobulin levels and azathioprine (100 mg/day for 1-3 yr) in 7 patients with initially increased immunoglobulin levels. Azathioprine had no favorable effect on the course of chronic hepatitis which would justify its use.

2347 HISTOCOMPATIBILITY ANTIGENS IN LIVER DISEASE. *(Ger.)* Freudenberg, J.; Erdmann, K.; Meyer zum Buschenfelde, K. H.; Forster, E.; Berger, J. (2nd Med. Clin., Johannes Gutenberg

Univ., Mainz, Germany). *Klin. Wochenschr.* 51(21):1075-1076, 1973.

Histocompatibility antigens (HL-A) were typed in 124 patients with acute hepatitis, 19 with chronic persistent hepatitis, 56 with chronic aggressive hepatitis, 42 with cirrhosis, 37 with metabolic diseases of the liver and in 83 normal controls. Among the 56 patients with chronic aggressive hepatitis, HL-A1 was found in 30 (54%) and HL-A8 in 34 (61%). The incidence of these antigens is significantly greater than among the controls (18% and 17%, resp.). These findings suggest that the HL-A locus on the chromosome is associated with certain immunological reactions. Therefore, HL-A typing can give information about genetic predisposition to and the pathogenesis of diseases.

2348 TREATMENT OF CHRONIC LIVER DISEASE. *(Ger.)*

Hilt, G.; Reitmeier, H. (Bayerwald Sanit., Cham-Windischbergerdorf, Germany). *Z. Allgemeinmed.* 49(7):327-329, 1973.

A comparison was made of the effects of 5% fructose infusions and Metabolan, a preparation containing xanthinol niacinate and B vitamins including biotin, on liver function tests, hepatosplenomegaly, and subjective symptoms in 84 patients with chronic liver disease. These patients consisted of 14 with steatotic hepatitis, 32 with chronic persistent hepatitis, 14 with chronic aggressive hepatitis, and 24 with manifest cirrhosis. Half of these patients received infusions of Metabolan 3 times a week in 500 ml 5% fructose with doses increasing to 3000 mg xanthinol niacinate; 2 Metabolan tablets were administered 3 times a day on the days between infusions. The other half of these patients received infusions of 5% fructose. Metabolan was significantly more effective than 5% fructose in reducing SGOT, SGPT, and serum glutamate dehydrogenase activities. It also reduced the volume of the liver and caused improvement in general well-being and symptoms such as meteorism, fullness, and fatigue. Although most patients initially complained that Metabolan caused flushing, pruritis, headaches, and anorexia, these symptoms usually decreased in intensity or disappeared. Metabolan did cause an increase in blood sugar levels in a diabetic with cirrhosis; it became necessary to increase the dose of insulin given to this patient. However, blood sugar levels decreased again when Metabolan infusions were replaced by p.o. administration of the drug. These findings suggest that Metabolan prevents hepatic necrosis and promotes regeneration of connective tissue.

2349 D-PENICILLAMINE THERAPY IN LIVER DISEASE: PRELIMINARY RESULTS FROM 44 CASES. *(Ger.)*

Alexander, M.; Wille, G. (Westend Clin., Free Univ., Berlin, Germany). *Munch. Med. Wochenschr.* 116(5): 211-216, 1974.

D-Penicillamine was given to 10 patients with protracted courses of acute viral hepatitis and to 34 with chronic aggressive hepatitis in various stages of development. Therapy was begun with 300 mg/day of D-penicillamine, and doses were gradually increased to 600-1800 mg/day. Patients also received supplements of vitamin B_6 (120-300 mg/day) and metals (salts of Fe, Co, Mg, Mn, and Zn once a week). Administration of D-penicillamine for 4-13 months to 15 patients with chronic aggressive hepatitis and incipient fibrosis caused definite improvement in 6, slight improvement in 3, and stabilization of fibrosis in 3. Therapy was discontinued in 3 cases. Of 10 patients with chronic aggressive hepatitis and histological evidence of cirrhotic changes, 4 improved, 4 showed no histological changes, and therapy was discontinued in 3 cases. Among 9 patients with active cirrhosis, 2 failed to improve and 6 had to stop taking D-penicillamine because of thrombocytopenia; the remaining patient has not been followed long enough for results to be evaluated. Of 10 patients with protracted courses of acute viral hepatitis, 8 improved significantly and 1 developed cirrhosis; no final histological follow-up was made on the remaining patient. In addition to thrombocytopenia, side effects included taste disturbances (1 patient) and allergies (4 patients). Two of the 4 patients with allergies were able to continue taking D-penicillamine after therapy had been discontinued by combining D-penicillamine with prednisolone. Although D-penicillamine appears to be effective in the treatment of protracted viral hepatitis and chronic aggressive hepatitis with incipient degenerative changes, it has little effect on active cirrhosis.

2350 TREATMENT OF CHRONIC LIVER DISEASE WITH D-PENICILLAMINE. *(Ger.)*

Wildhirt, E. (Munic. Hosp., Kassel, Germany). *Munch. Med. Wochenschr.* 116(5):217-220, 1974.

D-Penicillamine was used to treat 86 patients (54 men and 32 women) with chronic liver disease who had been treated unsuccessfully with conventional liver therapy, corticosteroids, or immunosuppressants for at least 3-6 months. These consisted of 60 patients with chronic aggressive hepatitis, 12 with protracted postacute hepatitis, 11 with posthepatitic or postnecrotic cirrhosis, and 3 with Wilson's disease. D-Penicillamine was instituted at a dose of 300 mg/day, and the dose was then increased to 1800 mg/day over a 4-week period. All patients also received vitamin B_6 (300 mg 3 times a week), and iron and trace metals were administered to all except those with Wilson's disease. After normalization of liver function tests and significant improvements in histological findings, the dose was reduced to 900-1200 mg/day. This dose was administered for 4 months after complete normalization or histological recovery to prevent rebound phenomenon. Therapy was unsuccessful in 26 of these 78 patients (32.5%): 12 failed to improve after at least 6 months and the drug had to be discontinued in 2 patients whose conditions became worse and 12 patients who developed side effects. Four patients died of other causes during treatment. Analysis of the results of liver function tests in the remaining 48 patients showed complete normalization in 30 (38%), significant improvement in 14 (18%), and no change in 4 (5%). Based on the results of follow-up biopsies performed on 39 of these patients, D-penicil-

mine gave very good results in 17, good results in
, and had no effect on 2. These results are
ch better than those previously obtained in 25 pa-
ents with long-term azathioprine therapy: inflam-
tory changes in the liver regressed in only 5 pa-
ents treated with this agent. D-Penicillamine pro-
ced side effects in 21.5% of the patients. Thera-
had to be discontinued in 12 patients (15%) be-
use of proteinuria (5 cases), allergy (4), and 1
se each of severe nausea, thrombocytopenia, and
ranulocytosis. Reversible side effects occurred
5 patients (6.5%) and consisted of allergy (2
ses), arthralgia (2), and thrombocytopenia (1).

51 THE RELATIONSHIP OF HEPATITIS ASSOCIATED
ANTIGEN (AUSTRALIA ANTIGEN) AND CHRONIC
TIVE HEPATITIS. REVIEW OF CURRENT LITERATURE.
.) Mazer, S. F. (Georgetown Univ. Sch. Med.,
shington, D.C.). *Med. Ann. D.C.* 42(10):490-494,
73.

2352 CHRONIC ACTIVIE HEPATITIS. *(E.)* Javitt, N. B. (New York Hosp.-Cornell Medical Center, New York). *Am. J. Med.* 55(6):733-735, 1973.

2353 IMMUNOELECTROPHORESIS OF SERUM GAMMAGLOBULINS IN CHRONIC HEPATITIS AND CIRRHOSIS OF THE LIVER. *(E.)* Ciobanu, V.; Zalaru, M. C.; Steinbruh, L.; Pambuccian, G.; Popescu, C. (Med. Polyclin., Bucharest, Rumania). *Med. Interna* 25(3):285-305, 1973.

See also 2016, 2334, 2335, 2341.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

54 PLASMA FACTOR X_a-INHIBITORY ACTIVITY IN
ALCOHOLIC LIVER DISEASE AND THE EFFECT OF
PARIN. *(E.)* Gavrilis, P.; Lerner, R. G.; Gold-
ein, R. (New York Med. Coll., N.Y.). *Thromb. Res.*
2):335-343, 1974.

ctor X_a-inhibitor (X_a-I) activity was measured in
patients with alcoholic liver disease and found
be more than 3 standard deviations below normal
14 patients. When trace amounts of heparin were
ded to these plasmas, the X_a-I activity was poten-
ated to the same level as normal plasma with
parin added. This suggests that X_a-I is actually
esent in alcoholic liver disease, but has less
an normal activity. Possible explanations such
the lack of endogenous heparin or the presence
an inhibitor are discussed. One explanation might
that patients with alcoholic liver disease have
low X_a-I level on direct kinetic analysis which
subsequently masked by the marked rate increase
used by adding heparin. A second explanation
ght be that there is an abnormal X_a-I molecule
ich has less than normal X_a-I activity but can be
tentiated to normal inhibitor levels by heparin.
hird explanation might be that normal individuals
ve a small amount of endogenous heparin which is
cking in patients with liver disease, and normal
-I activity depends upon its presence. Finally,
inhibitor might be present in patients with
ver disease.

55 FATTY LIVER PERSISTING FOR UP TO 33 YEARS.
A FOLLOW-UP OF THE IVERSEN/ROHOLM LIVER
OPSY METHOD. *(E.)* Hilden, M.; Juhl, E.; Thomsen,
C.; Christoffersen, P. (Bispebjerg Hosp., Copen-
gen, Denmark). *Acta Med. Scand.* 194(6):485-489,
73.

Re-evaluation of 890 consecutive liver biopsy specimens from the period 1938-1956 has been carried out and fatty liver was diagnosed in 59 cases. A follow-up examination was performed on 58 of these patients, their time of observation in respect to long-time prognosis of fatty liver varying from 16-33 yr. Half of them were alcoholics (defined as ethanol intake above 50 g/day for 5 yr). Evaluation of the liver was done on the basis of microscopy from repeated biopsy or autopsy (18 cases), on postmortem gross examination (19 cases), on clinical and laboratory findings (4 cases) or on death certificate (17 cases). In the follow-up period, cirrhosis of the liver was diagnosed in only 2 patients, 1 an alcoholic. A certain degree of fatty liver was shown in nearly all cases in which histology had been performed. These results support the hypothesis that steatosis and cirrhosis represent the various forms of liver response to alcohol, rather than coherent stages in the development of alcoholic liver damage. Thus, factors other than alcohol abuse must be important in the development of cirrhosis.

2356 FACTORS DETERMINING LIVER DAMAGE IN CHRONIC ALCOHOLICS. *(E.)* Eghoje, K. N.; Juhl, E. (Community Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 8(6):505-512, 1973.

Liver biopsies from 330 Danish chronic alcoholics showed cirrhosis in 60 cases and normal liver morphology in 29. Patients with cirrhosis were significantly older (average age, 46 yr), but the 2 groups did not differ with respect to sex, occupation, schooling, trade, and taxable income. Daily alcohol consumption averaged 181 g among patients with cirrhosis and 169 g among those with normal liver morphology. Average duration of alcohol abuse was 23 yr for cirrhotic patients compared with 17 yr for those with normal liver morphology. Significantly more patients with cirrhosis had a daily ethanol intake exceeding 125 g and significantly more had abused alcohol for more than 10 yr. The 2 groups did not differ in drinking habits: more than 90% of all patients preferred beer, alone or in combination with acquavit. All biochemical liver tests differed significantly in the 2 groups, as did the frequencies of symptoms and signs other than alcoholic dementia. This study suggests that the development of cirrhosis in chronic alcoholics is related to the extent and duration of alcohol abuse.

2357 REVERSIBILITY OF BIOLOGICAL SIGNS OF CIRRHOSIS IN THE CHRONIC ALCOHOLIC AFTER ABSTINENCE FROM ALCOHOL. *(Fr.)* Lamy, J.; Aron, E.; Lamy, J.; Martin, J. C.; Weill, J. (Fac. Med., Tours, France). *Clin. Chim. Acta* 49(2):189-193, 1973.

Immunoglobulins were separated by polyacrylamide gel electrophoresis, and serum transferrin and IgA concentrations were measured by radial immunodiffusion in 83 chronic alcoholics with no clinical evidence of cirrhosis who had stopped drinking for at least 1 yr. The values obtained were compared with those from 43 chronic alcoholics who continued to drink. Serum IgA levels decreased significantly in subjects who abstained from alcohol but increased significantly in those who cintinued drinking. Among the patients who abstained, a negative correlation was found between the decrease in IgA concentration and the initial IgA concentration. Abstinence did not produce a significant change in serum transferrin levels. The increase or decrease in IgA levels in chronic alcoholics may be correlated with inflammatory infiltration of the hepatic mesenchyma.

2358 MALLORY'S ('ALCOHOLIC') HYALINE IN PRIMARY BILIARY CIRRHOSIS. *(E.)* MacSween, R. N. M. (Western Inform., Glasgow, Scotland). *J. Clin. Pathol.* 26(5):340-342, 1973.

Mallory's hyaline was present in hepatocytes of 18 (26%) of 70 patients with primary biliary cirrhosis. None of these 18 patients had a documented history of alcohol abuse. The hyaline was noted in biopsy material for 12 patients and in autopsy material for 4. In 1 case it was present in both autopsy material and in a biopsy taken 6 yr earlier and in 1 case hyaline was identified in postmortem liver, there having been no earlier biopsy. The distribution of the hyaline was adjacent to portal tracts and connective tissue septa, and corresponded to the distributional pattern of peripheral cholestasis which is seen in primary biliary cirrhosis. However, none of the hepatocytes contained both retained bile and hyaline. In 5 cases hyaline deposits were present in considerable amounts, but in the remainder the deposits were scanty to moderate. In the 1 patient in whom hyaline was seen in both biopsy and autopsy material, greater amounts were present at autopsy. The presence of hyaline did not correlate with any other clinical or biochemical parameter of the disease. Recent studies have indicated that hyaline deposits belong to the category of contractile cytoplasmic filaments. The present findings further emphasize that they are probably not pathognomonic of alcohol abuse. However, the nature of this particular reaction of the hepatocyte to injury in a number of different diseases remains to be elucidated.

2359 AUGMENTED RELEASE OF HEPATIC TRIGLYCERIDES WITH ANABOLIC STEROIDS ON PATIENTS WITH FATTY LIVER. *(E.)* Mendenhall, C. L. (VA Hosp., Cincinnati, Ohio). *Am. J. Dig. Dis.* 19(2):122-126, 1974.

Hepatic triglyceride mobilization before and after treatment with norethandrolone (100 mg i.m.) was measured, using hepatic vein catherization, in 7 patients with fatty liver. An additional 2 patients were injected with isotonic saline in lieu of the anabolic steroid. Norethandrolone markedly increased hepatic triglyceride release over mean pretreatment and control values (22.7 mg/min). The effect was obvious in 6 of the 7 cases by 4 hr and was maximal (1616 mg/min) in all cases by 10 hr. The rate of triglyceride mobilization then decreased, returning to pretreatment values by 24 hr. In 4 patients for whom liver biopsy material was available, pretreatment hepatic venous blood resembled liver tissue in triglyceride composition. Norethandrolone increased the saturated fatty acids, principally palmitate and stearate, at the expense of oleate. An increase was also observed in medium-chain triglyceride fatty acids. It is concluded that anabolic steroids accelerate hepatic triglyceride removal through increased lipoprotein release and/or synthesis.

2360 EFFECTS OF PHENOBARBITAL ADMINISTRATION ON RATES OF ETHANOL CLEARANCE AND ON ETHANOL-OXIDIZING ENZYMES IN MAN. *(E.)* Mezey, E.; Robles, E. A. (Baltimore City Hosp., Md.). *Gastroenterology* 66(2):248-253, 1974.

The effects of phenobarbital administration on rates of ethanol disappearance from the blood and on the hepatic activities of the ethanol-oxidizing enzymes were determined in 4 male chronic alcoholic patients (aged 32-43 yr) without significant clinical evidence of liver disease. Phenobarbital (240 mg/day, p.o., in 4 divided doses for 6 consecutive days) resulted in significant increases, in the rates of ethanol disappearance from the blood (from 15.7 to 20.1 mg/100 ml serum/hr) and in the concentration of protein/g of liver wet weight (from 130.2 to 182.7 mg/g); however, no changes were observed in the activities of either alcohol dehydrogenase or the nicotinamide adenine dinucleotide phosphate-dependent ethanol-oxidizing system determined in liver homogenates. On the other hand, the urinary excretion of D-glucaric acid, an index of hepatic enzyme induction, was increased (from 13.9 to 58.7 μM/day). While this study demonstrates an enhancement of ethanol clearance from the blood after phenobarbital administration, the mechanism for this enhancement remains uncertain.

61 ALCOHOL AND THE ALIMENTARY TRACT. *(E.)*
Scott, A. J. (Auckland Hosp., New Zealand).
Med. J. 79(506):564-567, 1974.

62 MEDICAL PROBLEMS IN CHRONIC ALCOHOLIC MEN.
(E.) German, E. (Hosp. Joint Dis., New
rk, N. Y.). *J. Chron. Dis.* 26(10):661-668, 1973.

See also 1742, 1749, 1768, 1785, 1861, 2024.

LIVER AND BILIARY TRACT

Cirrhosis

53 LONG-TERM RESULTS FROM TREATING CIRRHOSIS BY LIGATING THE HEPATIC ARTERY. (25 CASES).
.) Leger, L.; Albot, G.; Cachin, M.; Lemaigre,
; Blondel, P. (Cochin Hosp., Paris, France).
n Chir. 69(5):321-326, 1973.

tween 1951 and 1963, the common hepatic artery was
gated in 25 patients (10 women and 15 men, aged
-67 yr) with severe cirrhosis. Ascites was pre-
nt in 16, jaundice in 2, and 10 presented with gas-
ointestinal bleeding. Of these 25 patients, 11
ed within 2 months after surgery and 6 in satis-
ctory condition were lost to follow-up after 20
s to 3 yr. Of the 8 survivors, 6 died after 9
nths to 11 yr, and 2 are still alive 13 and 15 yr
er surgery. An analysis of the findings in 5
ients who survived for more than 5 yr reveals
t ligation of the hepatic artery does not cause
asting reduction in portal pressure and has no
nificant effect on ascites or gastrointestinal
eeding. This procedure did improve liver function
ts and caused stabilization of sclerosis, regres-
n of inflammatory infiltrates, and hyperplastic
eneration of cirrhotic nodules. Steatosis, the
nificance of which is unknown, appeared in 3 of
4 patients whose histological findings are
cribed. These long-term findings suggest that
r results obtained with ligation of the hepatic
ery cannot be attributed entirely to the method
are also due to poor selection of candidates
this procedure. These patients were in poor
eral condition before surgery and currently used
retics, protease inhibitors, and ε-aminocaproic
d were not available.

4 PAROTID HYPERTROPHY IN CIRRHOSIS. I. CLINICAL AND FUNCTIONAL STUDY. *(Sp.)* Rod-
o Gomez, J. M.; Aparisi Quereda, L.; Palao Esteve,
Guix Garcia, J.; Serra Desfilis, M. A.; Benages
tinez, A.; Garcia-Conde Gomez, F. J. (Fac. Med.,
encia, Spain). *Rev. Esp. Enferm. Apar. Dig.*
527-538, 1973.

nical evidence of parotid hypertrophy was detected
the criteria of Sposito and Wolfe in 20 of 68
ients with cirrhosis (29%). These consisted of
patients with grade I hypertrophy, 6 with grade
and 3 with grade III. Parotid hypertrophy was
sent in 9 of 27 patients with alcoholic cirrho-
and in 14 of 41 with other forms; this difference is not significant. Of the 20 patients with cirrhosis and parotid hypertrophy, 8 had body weights greater than their ideal weight. These 8 patients had a significantly greater incidence of more pronounced parotid hypertrophy than the 12 patients who had body weights lower than their ideal weight, suggesting that apparent hypertrophy in overweight patients is really due to deposits of fat. No correlations were found between the extent of parotid hypertrophy and plasma albumin levels, ascites, or hepatosplenomegaly. The correlation between the extent of parotid hypertrophy and alcoholism was of borderline significance. A comparison of the parotid saliva output, the pH of the saliva, and salivary amylase activity was made under basal conditions and after stimulation with 2% citric acid in 16 patients with cirrhosis and parotid hypertrophy and 17 normal controls. No significant differences were found between the 2 groups in any of these 3 parameters or between these parameters and the extent of hypertrophy.

2365 PAROTID HYPERTROPHY IN CIRRHOSIS. II. MORPHOLOGICAL, HISTOCHEMICAL, AND ULTRASTRUCTURAL STUDY. *(Sp.)* Rodrigo Gomez, J. M.; Peydro Olaya, A.; Llombart Bosch, A.; Aparisi Quereda, L.; Serra Desfilis, M. A.; Guix Garcia, J.; Palao Esteve, J.; Benages Martinez, A.; Garcia-Conde Gomez, F. J. (Fac. Med., Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(7):751-770, 1973.

Histological, histochemical, and ultrastructural examinations were performed on biopsied material from the parotid glands of 20 patients with cirrhosis and clinical parotid hypertrophy as determined by the criteria of Sposito and Wolfe. Sialographic examinations, performed on 15 of these patients, were completely normal in 9 cases except for the apparent increase in size. In the remaining 6 cases there was massive lobular filling and ductal angles greater than 90°. None of these patients had parotid lithiasis or sialectasia. Except for microlithiasis in the striated ducts in one case, histological findings were essentially normal. Although no evidence of increased mitosis was found, acinar cells were hypertrophied and filled with secretion granules, and moderate fat infiltration was observed. Staining with Sudan III showed marked degeneration of parenchymal fat and the presence of small vacuoles of fat in the protoplasm in all parts of the gland. Electron microscopy revealed that these vacuoles sometimes produced deformations in the nuclear membrane. Secretion of the mucus type was more abundant in parotid acinar cells of patients with cirrhosis than in those of 3 normal controls. Histochemical studies of a variety of enzymes showed a radically different pattern of activities from that in experimental sialoadenosis induced in rats with isoproterenol. This suggests that experimental sialoadenosis is not a good model for studying asymptomatic parotid hypertrophy in man.

2366 CRUVEILHIER-BAUMGARTEN DISEASE ASSOCIATED WITH CIRRHOSIS. *(Ger.)* Dux, E.; Laszlo, A. (Med. Univ., Szeged, Hungary). *Monatsschr. Kinderheilk.* 121(3):98-100, 1973.

A 9.5-yr-old boy with a history of hepatitis developed ascites preceded by rapidly increasing signs of venous dilatation on the abdominal wall. The patient's condition deteriorated rapidly with vomiting, increaingly pathological liver function tests, and a large subcutaneous hemorrhage on the abdomen near the genitals. Abdominal paracentesis yielded 9 liters of yellow fluid. The patient developed severe pains in the lower abdomen 9 hr after surgery and collapsed and died despite administration of transfusions, infusions, and drugs to increase his blood pressure. Autopsy revealed a persistent, dilated umbilical vein which opened into the portal vein. Large abdominal veins were dilated and sclerotic due to portal hypertension, and massive enlargement of the spleen, ascites (4.5 liters), and congestion of the gastric and duodenal mucosa could be traced to portal congestion. Other findings included postnecrotic cirrhosis, esophageal varices, and 400 ml of fresh blood in the stomach and duodenum. The immediate cause of death is considered to be ruptured esophageal varices although the site of the rupture could not be located. Despite the presence of severe cirrhosis, this patient is diagnosed as having Cruveilhier-Baumgarten's disease, rather than Cruveilhier-Baumgarten's syndrome, because of the persistent umbilical vein. The cirrhosis was so severe that it could not be determined whether it had been preceded by hepatic hypoplasia. However, portal hypertension must have been present before obliteration of the umbilical vein occurred.

2367 CHANGES IN SOME PARAMETERS OF CONNECTIVE TISSUE METABOLISM IN CIRRHOSIS. *(Cz.)* Kuzela, L.; Horky, J. (Inst. Clin. Exp. Med., Prague, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 27(4): 217-223, 1973.

Connective tissue metabolism was investigated in the livers of 15 patients with cirrhosis and 13 normal controls, and these findings were compared with those obtained in Wistar rats with cirrhosis induced by carbon tetrachloride (1 ml/kg diluted 1:1 with olive oil given twice a day for 10 days) and in untreated controls. Statistically significant increases were found in the contents of hydroxyproline in both total and insoluble collagen fractions obtained from the livers of rats with cirrhosis. The content of hydroxyproline in insoluble collagen was also significantly increased in liver biopsies from patients with cirrhosis, and the absolute quantity of hydroxyproline in this fraction was somewhat larger than that in rats with cirrhosis. This is due partly to the greater degree of regeneration in the human livers and partly to species differences in the content of connective tissue in the liver. Although serum concentrations of total hydroxyproline were moderately increased in 9 cirrhotics, the difference between cirrhotics and controls was not statistically significant. With one exception, 24-hr excretion of acid mucopolysaccharides in the urine was not increased in patients with cirrhosis; values varied considerably when determinations were performed on several successive days. These findings in cirrhotics, together with others previously reported in the literature, are similar to those which occur in kwashiorkor. It is suggested that hepatocytes become malnourished in cirrhosis because of the proliferation of connective tissue, particularly in Disse's spaces where the supply of nutrients to the sinusoids becomes difficult. Thus, the hepatocytes are functionally less efficient and become very vulnerable to various toxic substances which the normal liver is able to eliminate rapidly.

2368 PORTAL-SYSTEMIC SHUNT IN HEPATIC CIRRHOSIS: DOES THE TYPE OF SHUNT DECISIVELY INFLUENCE THE CLINICAL RESULT? *(E.)* Bismuth, H.; Franco, D.; Hepp, J. (Hospital Paul-Brousse, Villejuif, France). *Ann. Surg.* 179(2):209-218, 1974.

Three different shunt techniques were studied: total direct portal-systemic shunt by end-to-side, or large-stoma side-to-side, porta-caval anastomosis in 25 patients; partial direct portal-systemic shunt by small-stoma side-to-side portacaval anastomosis in 23 patients; and central splenorenal anastomosis in 72 patients. The mean age of the patients was 50 yr, the range was 21 to 74. Alcholic cirrhosis was the best represented cause; the others included postnecrotic, primary biliary, and hemochromatosis. Of the 3 portal-systemic shunt procedures used, total direct portacaval anastomosis produced the greatest fall in portal pressure (14.6 mm Hg), the lowest post-shunt portal pressure (11.5 mm Hg), and a postshunt portal-caval pressure gradient of 3.4 mm Hg. Partial direct portacaval anastomosis lowered the portal pressure by 9.6 mm Hg to 14.4 mm Hg, and maintained the highest portal-caval pressure gradient 7.2 mm Hg. Splenorenal anastomosis gave a postshunt splenic vein pressure of 15.1 mm Hg; it left a splenorenal pressure gradient of 1.8 mm Hg. After small-stoma side-to-side portacaval anastomosis diversion of portal blood was partial in all the cases studied. After splenorenal anastomosis, 2 types of hemodynamic patterns were observed: partial diversion of portal blood and total diversion of portal blood. Thirty patients (25%) died, 2 during the first 60 postoperative days. Five-year survival was 65.9% for the whole series: 69.7% for total portacaval anastomosis; 65.8% for partial postacaval anastomosis; and 65.4% for splenorenal anastomosis. The principal nonimmediate cause of death was hepatocellular failure. The group in which hepatocellular failure was most lethal was the splenorenal anastomos

oup, in which it accounted for 70.6% of the deaths.
deaths were due to recurrent bleeding. Patients
er 60 had a slightly better survival rate than
tients under 60. Bleeding recurred in 5 patients,
l belonging to the splenorenal anastomosis group.
entgenographic examination by barium swallow 15
ys after operation in 86 patients revealed dis-
pearance of the esophagogastric varices in 65,
minution in 18, and no change in 3. Hepatic
cephalopathy developed in 14 patients; the severity
encephalopathy did not vary with shunt type. No
gnificant differences were found between the 3
unt types as regards postoperative mortality,
ng-term survival, recurrence of gastrointestinal
morrhage, persistence of esophagoagastric varices,
occurrence of hepatic encephalopathy.

59 LIVER BIOPSY FINDINGS IN CHILDREN WITH OBLITERATIVE PORTAL HYPERTENSION. *(E.)*

ister, P.; Engert, J. (Dept. Pathol., Univ. Munich,
rmany). *Beitr. Pathol.* 149(3):307-310, 1973.

ntralobular hepatic changes similar to those fre-
ently seen in adults with cardiac congestion were
served in 8 consecutive cases of children with
rtal vein thrombosis, unassociated with hepatic
sions compatible with intrahepatic block or
idence of posthepatic block. The 8 cases showed
ither fibrosis with destruction of hepatic archi-
cture, nor changes of the intrahepatic portal vein
anches or signs of venocclusive disease as possible
rphological correlates of portal hypertension caused
liver disease. In all of these 8 cases, peculiar
ntralobular perivenous changes were found. The
llagen fibers could well be demonstrated by van
eson stains. Most impressive were the increased
mbers and calibers of fibrillary structures after
lver impregnation. Long-term studies are needed to
parate late changes after primary portal vein
rombosis with secondary hepatic fibrosis and
literation of intrahepatic portal vein from primary,
e., congenital hepatic fibrosis with hypoplasia
intrahepatic portal vein branches and secondary
rtal vein thrombosis after portal hypertension.

0 TREATMENT OF EXTRAHEPATIC OBSTRUCTION OF THE PORTAL VEIN SYSTEM. *(E.)* Nielsen,

V.; Malmstrom, J.; Pagel, J.; Efsen, F. (Rigs-
p., Copenhagen, Denmark). *Scand. J. Gastroenterol.*
):599-604, 1973.

treatment of 7 patients with portal hypertension
sed by extrahepatic obstruction of the portal vein
described. Six of the patients presented gastro-
estinal bleeding from esophageal or fundic vari-
ities. All patients had a normal liver function,
in no case was ascites found. On admission,
enoportography was performed. There were 4
ales and 3 males. Their ages ranged from 8 to
yr. The splenic pressure (mm Hg) ranged from 15
34. The site of the obstruction was V. portae
all 7 patients and 2 patients also had obstruc-
ns in V. lienalis. The etiology included severe
troenteritis, pyle-thrombosis, ligation of portal
n, Boeck's sarcoid, and pancreatitis. Three
ients received no operations. The operations in
the remaining 4 included: portacaval shunt end-to-side; splenectomy and spleno-renal shunt end-to side either singly or with a mesocaval shunt; and a spleno-renal shunt side-to-side plus a portacaval shunt end-to-side. Three of the operations resulted in no complications; postoperative thrombosis and rebleeding occurred after 3 operations. One of the 7 patients is died; the others are alive and well. It is thought that surgery might not have been necessary for all 4 patients. None of them bled heavily, and it is known that patients with extrahepatic obstruction tolerate the bleeding episodes better than do patients with cirrhosis of the liver. It is concluded that the only way to distinguish the patients who need surgical interventions from those with spontaneous regression is by repeated splenoportographic studies.

2371 'ERYTHROPOIETIC' PROTOPORPHYRIA AND CIRRHOSIS IN SISTERS. *(E.)* Thompson,

R. P. H.; Molland, E. A.; Nicholson, D. C.; Gray, C. H. (St. Thomas' Hosp., London, England). *Gut* 14(12):934-938, 1973.

The clinical and histopathological features of 2 sisters with erythropoietic protoporphyria and liver disease are described. There was no history of photosensitivity in their other 9 siblings or in the parents. These sisters had life-long photosensitivity, followed later by severe blistering. They both became jaundiced and died at the age of 31 with cirrhosis. The retrospective diagnoses of erythropoietic protoporphyria were made from the photosensitivity from childhood, greatly raised levels of fecal and proto- and coproporphyrins, and from the raised levels of protoporphyrin in the plasma of 1 sister and of protoporphyrin and coproporphyrin, in red cells of the second sister. Both the sisters thought that jaundice followed exposure to sun, but a careful history revealed that the intense blistering occurred only after exposure when jaundice had developed. Serum bilirubin, however, correlated poorly with the severity of photosensitivity and with the excretion of porphyrins. A microscopical postmortem examination of the livers showed cirrhosis with bile duct proliferation and a lymphocyte infiltration of the septa. Dark-brown pigment was present and distributed in granules within liver cells, in Kupffer cells, as plugs in canaliculi and in the septa. The characteristic red autofluorescence under ultraviolet light, and birefringent crystals and Maltese cross figures under polarized light were demonstrated. There was widespread cholestasis.

2372 AUSTRALIA ANTIGEN AND PRIMARY BILIARY CIRRHOSIS. *(E.)* MacSween, R. N. M.;

Laiwah, A. A. C. Y.; Busuttil, A. A.; Thomas, M. A.; Ross, S. K.; Watkinson, G.; Millman, I.; Blumberg, B. S. (Dept. Pathol., Univ. Glasgow, Scotland). *J. Clin. Pathol.* 26(5):335-339, 1973.

Sera from 64 patients with primary biliary cirrhosis were examined for Australia antigen. Lymphocyte transformation studies were performed on peripheral blood lymphocytes in 24 patients with primary biliary cirrhosis and 24 age- and sex-matched controls, using as transforming agent a serum rich in Australia antigen and which had been shown to produce lymphocyte transformation in patients who had recovered from a previous clinical attack of Australia antigen-positive serum hepatitis. On immunodiffusion and immunoelectrophoresis testing, detectable quantities of Australia antigen were present in 10 of 64 sera (16%), an incidence significantly different from the 3% in controls. In only 1 of 24 patients with primary biliary cirrhosis did the peripheral blood lymphocytes transform in response to an Australia antigen-rich serum, the lymphocytes showing a 3.5-fold increase in ^{14}C-thymidine incorporation as compared with unstimulated controls. No lymphocyte transformation was obtained in lymphocytes from the 24 control patients. It is suggested that the finding of a statistically increased frequency of Australia antigen in the patients with primary biliary cirrhosis is of biological significance. The failure to show delayed hypersensitivity to Australia antigen in these patients could be a manifestation of the reported impairment of cellular immunity in this disease, and could offer an explanation for the apparent persistence of the virus in some instances.

2373 TOXIC METABOLITES IN THE BRAINS OF PATIENTS WITH CIRRHOSIS AND PORTACAVAL SHUNT.

(Ger.) Lesch, P. (Med. Coll., Hannover, Germany). *Dtsch. Med. Wochenschr.* 98(41):1929-1931, 1973.

The toxic metabolites, p-hydroxyphenylacetic and p-hydroxyphenyllactic acids, were isolated from the brain of a patient who died in hepatic coma 12 yr after undergoing surgery for creation of a portacaval shunt. The hepatic coma resulted from posthepatitic cirrhosis and secondary liver injury induced by alcohol. The content of p-hydroxyphenylacetic acid was 74.9 nM/100 g wet weight and that of p-hydroxyphenyllactic acid was 25.8 nM/100 g wet weight of tissue. Some of the p-hydroxyphenylacetic acid may have formed by decarboxylation of p-hydroxyphenylpyruvic acid during gas chromatography. Qualitative analysis revealed that p-hydroxyphenylacetic acid was also present in the brain of another patient wit the same history, but these toxic metabolites were not detected in the brains of "normal" patients or patients who died of hepatic coma but did not have portacaval shunts. It is suggested that interaction may occur between lipids in the brain and these p-hydroxycarboxylic acids which could cause allosteric enzyme inhibition and produce metabolic disturbances which would result in changes in lipid structure. This would have a deleterious effect on the selectiv permeability of interfaces which, in conjunction with other metabolic abnormalities (e.g. dehydration increased blood levels of amino acids, low blood sug levels, etc.), might result in decompensation of cerebral metabolism which is clinically manifested as hepatic coma.

2374 DECREASED ARTERIAL OXYGEN CONCENTRATIONS AND HEMODYNAMIC CHANGES IN CIRRHOSIS.

(Ger.) Baltzer, G.; Arndt, H.; Martini, G. A. (Med. Clin., Univ. Marburg/Lahn, Germany). *Klin. Wochenschr.* 51(21):1033-1042, 1973.

2375 INCREASE IN HEPATIC SIZE AFTER SPLENECTOMY FOR PORTAL VEIN THROMBOSIS.

(E.) Spencer, R. P.; Antar, M. A.; Touloukian, R. J. (Yale Univ. Sch. Med., New Haven, Conn.). *J. Nucl. Med.* 14(11):854-855, 1973.

See also 1758, 1790, 1984, 1995, 2017, 2024, 2034, 2181, 2261, 2319, 2350, 2353.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

2376 ENZYME HISTOCHEMISTRY OF THE LIVER IN EXTRAHEPATIC BILIARY OBSTRUCTION. A COMPARISON BETWEEN MAN, DOG, AND RAT.

(E.) Hagerstrand, I. (Inst. Pathol., Univ. Lund, Malmo, Sweden). *Acta Pathol. Microbiol. Scand.* [*A*] 81(6):737-750, 1973.

Morphological and enzyme histochemical changes during extrahepatic biliary obstruction in the liver tissue of man, dog and rat were compared. The differences in morphological changes were mainly quantitative. Ductular proliferation was less marked and occurred later in livers of man and dog than in rat liver and there were more cellular changes centrolobularly in the livers of the former 2 species. The qualitative differences consisted of lack of cholestasis in the rat liver and of focal necroses in the dog liver. Staining for succinic dehydrogenase and glucose-6-phosphatase showed decreased activity while lactic dehydrogenase and mono-amine oxidase remained unchanged. The lysosomal enzyme activities (acid phos phatase and beta-glucuronidase) were increased in hepatocytes and Kupffer cells, but the increase was most evident in connection with biliary pigment in livers of dog and man. The membrane-associated hydr lases (adenosine triphosphatase, alkaline phosphatas leucine aminopeptidase, gamma-glutamyl transpeptidas varied in the 3 species with alternating increase an decrease at the sinusoids and canaliculi. The incre amount of reaction product in hepatocytes and the in creased numbers of positive Kupffer cells revealed b staining for acid phosphatase and beta-glucuronidase activity are correlated with the ultrastructural fin ing of increased numbers of lysosomes and phagosomes both in hepatocytes and in Kupffer cells. Thus, the is reason to interpret the increased staining as an increase in numbers of enzyme molecules. The serum values for gamma-glutamyl transpeptidase activity in

ıe 3 species varied with the histochemical patterns.
ıe serum increase was by far the highest in man.
ıe smallest rise was observed in the rat. In this
ıimal, the proliferating ductular epithelium showed
ctivity. In the dog liver there was activity of
amma-glutamyl transpeptidase in periportal canaliculi
ıd a moderate increase was noticed in serum activity.

377 METABOLISM OF LITHOCHOLIC ACID-24-^{14}C IN EXTRAHEPATIC BILIARY ATRESIA. *(E.)*

rman, A.; Strandvik, B. (Karolinska Inst.,
ockholm, Sweden). *Acta Paediatr. Scand.* 63(1):
-96, 1974.

ithocholic acid-24-^{14}C was given to 2 infants with
trahepatic biliary atresia. After oral admini-
ration about half of the isotope was absorbed.
ter parenteral administration, about half of the
sotope was excreted in the urine for 3 days.
ithocholic acid was transformed to a small extent
more polar compounds. These metabolites were
t cholic, chenodeoxycholic, α- or β-muricholic,
ocholic, hyodeoxycholic or ursodeoxycholic acids.
st of the lithocholic acid was excreted as sul-
ate esters of tauro- and glycolithocholic acid.
sulphate ester of lithocholic or free lithocholic
id was excreted. The high degree of sulphation
lithocholic acid conjugates observed in this
vestigation and the low quantitative excretion of
ithocholic acid previously observed suggest that
ithocholic acid is no important factor in the
pid progression of cirrhosis observed in extra-
patic biliary atresia.

78 BILIARY LIPID OUTPUTS IN YOUNG WOMEN WITH CHOLESTEROL GALLSTONES. *(E.)*

Grundy, S.
; Duane, W. C.; Adler, R. D.; Aron, J. M.; Metzger,
L. (Phoenix Indian Med. Ctr., Ariz.). *Metabolism*
(1):67-73, 1974.

patic secretions of biliary lipids were determined
8 young women with cholesterol gallstones and 14
ite women without gallstones. All of the gallstone
tients were non-Indian; 7 were white and 1 was
ack. Hourly outputs of biliary cholesterol were
gnificantly greater in gallstone patients than in
ite controls. This increased cholesterol output was
major factor in the production of lithogenic bile.
e greater cholesterol output in gallstone patients
s apparently related to obesity. Despite an in-
eased hepatic secretion of cholesterol, secretion
tes of bile acids were relatively low in gallstone
tients. However, there was considerable overlap
tween secretion rates of bile acids in subjects
th and without stones, and it was not demonstrated
at an absolute deficiency of bile acids existed
gallstone patients. Nevertheless, the contribution
an increased output of biliary cholesterol to the
rmation of lithogenic bile was clearly evident in
r patients. This study illustrates a mechanism for
thogenic bile formation, excessive secretion of
olesterol without a compensatory increase in bile-
id outputs. It is suggested that this mechanism
y be important for gallstone formation in obese
ung women regardless of their racial backgrounds. One approach to reduction of bile lithogenicity would be to expand the enterohepatic circulation of bile acids, especially when a deficiency exists. This might be accomplished either by enhancing bile-acid synthesis or through oral administration of bile acids. Another technique could be to decrease biliary outputs of cholesterol. In obese patients, weight reduction causes a lowering of cholesterol synthesis, and it thus seems likely that weight reduction would also decrease hepatic secretion of cholesterol. Another means for reducing biliary cholesterol may be oral administration of chenodeoxycholic acid. This latter approach seems particularly promising in view of the potential usefulness of this bile acid for gallstone dissolution.

2379 ADENOCARCINOMA OF THE AMPULLA OF VATER ASSOCIATED WITH FAMILIAL POLYPOSIS COLI: REPORT OF A CASE. *(E.)*

Mir Madjlessi, S. H.; Farmer, R. G.; Hawk, W. A.; Turnbull, Jr., R. B. (Cleveland Clin. Fdn., Ohio). *Dis. Colon Rectum* 16(6):542-546, 1973.

A 40 yr old male was treated with prednisone (20 mg/day) for jaundice from suspected viral hepatitis. Further studies proved viral hepatitis was not the cause of the jaundice, but rather the patient was suffering from diffuse polyposis coli and adenocarcinoma of ampulla of Vater. Laboratory data reported total bilirubin, 11.1 mg/100 ml; SGOT, 140 U/100 ml; and alkaline phosphatase, 160 Ka units/100 ml. Familial history included the deaths of his mother and 1 sister due to cancer of the colon, 1 brother had diffuse polyopsis of the colon, 1 of 2 daughters and his 1 son had had subtotal colectomies for diffuse polyposis coli. Both of these siblings had sebaceous cysts of the scalp. It is suggested that coexistent ampullary carcinoma should be considered in all patients with familial polyposis coli, Gardner's syndrome, or their variants. The ampullary area should be carefully examined with conventional roentgenographic methods. An aggressive approach to remove the ampullary carcinoma seems favored in that the outcome of patients so treated is generally good. It is further suggested that the combination of familial polyposis coli or Gardner's syndrome and ampullary carcinoma may represent a new nosologic entity.

2380 EXPERIENCES IN THE MANAGEMENT OF SURGICALLY CORRECTABLE BILIARY ATRESIA. *(E.)*

Arima, E.; Fonkalsrude, E. W.; Neerhout, R. C. (Univ. Calif. Sch. of Med., Los Angeles). *Surgery* 75(2):228-232, 1974.

The experiences at the UCLA Hospital with 10 patients who have undergone biliary-enteric anastomosis for extrahepatic biliary atresia during the past 16 yr is summarized. There were 7 females and 3 males. Their ages at time of operation ranged from 6 weeks to 4 1/2 yr. The types of operations included: Choledochoduodenostomy, revision of choledochojejunostomy, tube drainage of duct, splenectomy for hypersplenism, mesocaval shunt for varices, hepaticoduodenostomy, longmire procedure, persistent jaundice, revision of longmire procedure, closure of enteric fistula, open-liver biopsy, and catheter drainage of duct. The complications included: cholangitis, biliary obstruction, mild cirrhosis, sepsis, hepatomegaly, varices, intestinal obstruction, enteric fistula, hepatic failure, ascites, persistent jaundice, and mild and transient ascites. Five of the patients died. Three patients had 3 different operations, 1 had 4, 3 had 2 operations, and 3 had 1 operation. It is concluded that the evidence from this study supports the view that when drainage is established before the age of 4 months in a patient with a correctable form of biliary atresia, long-term survival is possible. When drainage is deferred an additional few months, biliary cirrhosis becomes irreversible, minimal quantities of bile may be drained, and early death usually results.

2381 EMPYEMA OF THE GALLBLADDER DUE TO HAEMOPHILUS PARAHAEMOLYTICUS WITH A BRIEF REVIEW OF ITS ROLE AS A PATHOGEN.

(E.) Parsons, M.; Faris, I. (Middlesex Hosp. Med. Sch., London, England). *J. Clin. Pathol.* 26:604-605, 1973.

A case history of a 40-year-old policeman with empyema of the gallbladder caused by *Haemophilus parahemolyticus* is reported. At operation, the gallbladder was embedded in the liver. While being freed it was inadvertently ruptured and thick pus escaped. This was immediately aspirated into a syringe and sent for culture. There were stones in the gallbladder but none in the common duct. Gram staining of the pus showed many small pleomorphic Gram-negative rods. After 18 hr incubation on Columbia agar with 5% horse blood, it produced a pure growth of small grey β-hemolytic colonies which were facultatively anerobic. On nutrient agar there was abundant growth round discs containing V and X + V factors but none around that contained X factor only. This was repeated on subculture from around the V factor disc. The organism was nonmotile, indole negative, and reduced nitrates. Histology of the gallbladder showed marked inflammatory thickening of the wall, with gross muscle hypertrophy and intramural diverticula. The stones were of cholesterol. How the organism reached this patient's gallbladder is not certain. There may have been a transient bacteremia, as is known with other upper respiratory tract commensals, in which the bacteria came through the gallbladder wall. This would be in accord with the current theory that bacteria in the bile tend to get there from the bloodstream through the wall rather than by ascending from the gut.

2382 URINARY BILE ACID CONJUGATES IN EXTRAHEPATIC BILIARY ATRESIA.

(E.) Norman, A.; Strandvik, B.; Ojamae, O. (Dept. Clin. Chem., Univ. Linkoping, Sweden). *Acta Paediatr. Scand.* 63(1): 97-102, 1974.

The urinary excretion of bile acid conjugates was studied after the administration of 24-^{14}C-labelled chenodeoxycholic acid and cholic acid and their corresponding glycine conjugates labelled with glycine-1-^{14}C in 5 infants with extrahepatic biliary atresia. Chenodeoxycholic acid-24-^{14}C and chenodeoxycholyl[1-^{14}C]glycine were mainly excreted in the form of labelled metabolites with the thin layer chromatography behavior of monosulphates of tauro- and glycochenodeoxycholate and glycochenodeoxycholate, respectively. Most of the cholic acid-24-^{14}C and the choly[1-^{14}C]glycine were found to be excreted in the form of glycocholate. All labelled bile acids were excreted in conjugated form.

2383 ALTERATION OF BILE SALT METABOLISM BY DIETARY FIBRE (BRAN).

(E.) Pomare, E. W.; Heaton, K. W. (Bristol Roy. Infirm., England). *Br. Med. J.* (5887):262-264, 1973.

Feeding dietary fiber in the form of bran induced changes in bile salt metabolism in 5 people with intact gall bladders. There was evidence of reduced dehydroxylation of bile salts; the proportion of deoxycholate conjugates in bile was reduced and the transfer of radioactivity from labelled taurocholate to deoxycholate was decreased. These findings, which were independent of changes in intestinal transit rate, imply that bran reduced the degradation bile of salts by colonic bacteria. This property of bran accords with recent theories that fiber-depleted diets favor the degradation of bile salts in the colon. These findings may be relevant to the etiology of large bowel cancer.

2384 TWENTY-FIVE-YEAR SURVIVAL AFTER SURGERY FOR COMPLETE EXTRAHEPATIC BILIARY ATRESIA. A CASE REPORT.

(E.) Berenson, M. M.; Garde, A. R.; Moody, F. G. (VA Hosp., Salt Lake City, Utah). *Gastroenterology* 66(2):260-263, 1974.

A case history is presented of a patient who at the age of 12 weeks underwent cholangioduodenostomy for treatment of complete atresia of the common bile duct. After surgery, her course was punctuated by episodes of cholangitis and jaundice. When she was 25 years of age, a liver biopsy showed biliary cirrhosis. Percutaneous cholangiography revealed dilated and deformed intrahepatic biliary ducts containing stones. Surgical removal of the stones and revision of the cholangioduodenal anastomosis was performed. Intrahepatic cholelithiasis has not previously been reported as a complication of this disorder. Her survival is the longest reported in the world literature for this condition, and emphasizes the need to vigorously pursue potentially operable cases.

2385 EARLY AND DELAYED OPERATION IN ACUTE GALLSTONE DISEASE.

(E.) Sokhi, G. S.; Longland, C. J. (Roy. Infirm., Glasgow, Scotland). *Br. J. Surg.* 60(12):937-939, 1973.

A comparison is presented of patients who had gallbladder operations during the emergency admission and those who had later operations. There were 60 patients who had delayed operations and received orthodox conservative management of the acute attack and discharge from the hospital, followed by read-ission at a later date and definitive surgery. The ean age of this group was 58 yr and the range was 1 to 81. A group of 52 patients received an early peration, during the first admission. The mean age as 56 yr and the range was 17 to 80. There were 45 atients who received no operation. The patients n this mixed group either died without operation 3) or after cholecystostomy alone (1), declined peration (5), or failed to return after initial onservative treatment and discharge from the hospital 11). A further 25 patients were considered unfit or definitive operation. The mean age was 63 yr, he range was 23 to 87. After delayed operation, here was 1 death. After early operation there were deaths. The highest mortality was in the patients ho had no definitive operation, 4 deaths. The roportion of patients having recorded complications as about the same following delayed and early peration. Wound infection and pulmonary infection ccurred most often. Cardiac and renal problems ere the next most frequent complications. The ean total hospital stay for the delayed operation atients, including the emergency and elective ad- issions and any intermediate admissions, was 30 days. or those patients in whom surgery was completed at he first admission, the mean total hospital stay as 25 days. It is concluded that among the patients urveyed with acute gallstone disease, there was no tatistically significant difference in the operative ortality between the patients who were operated on uring the emergency admission and those having elayed operation at a second admission. The fre- uency of recorded postoperative complications were early the same in both groups.

386 INHIBITION OF BILIRUBIN EXCRETION IN MAN DURING DEHYDROCHOLATE CHOLERESIS. *(E.)*

loomer, J. R.; Bover, J. L.; Klatskin, G. (Yale niv. Sch. Med., New Haven, Conn.). *Gastroentero- ogy* 65(6):929-934, 1973.

odium dehydrocholate (Decholin), was given intra- enously to 5 fasting patients with external bili- ry drainage to determine its effect on bilirubin xcretion. The range of bile flow for these patients uring control periods was 0.31 to 0.44 ml/min, and or bile bilirubin concentrations was 25.9 to 57.6 mg/ 00 ml. Bile bilirubin concentrations decreased to evels that were 8 to 18% of control values during he 60- to 70-min period after Decholin administra- ion. In each patient the decrease in bile bili- ubin concentration was greater than could be ac- ounted for by the dilutional effect of increased ile water formation, and the rate of bilirubin xcretion in bile diminished after Decholin admini- tration. Studies with intravenously administered ilirubin-^{3}H in 2 patients demonstrated that the umulative recovery of label in bile was slower fter giving Decholin, and the plasma disappearance ate of unconjugated bilirubin-^{3}H was delayed. The ata indicate that Decholin inhibits bilirubin ex- retion in man despite its choleretic effect.

387 BILE SALT METABOLISM IN PATIENTS WITH GALLSTONES IN FUNCTIONING GALLBLADDERS. *(E.)*

Pomare, E. W.; Heaton, K. W. (Roy. Infirm., Bristol, England). *Gut* 14(11):885-890, 1973.

Isotopic bile salt studies were performed in 8 middle-aged women with radiolucent gallstones in functioning gallbladders and in 10 matched controls. In the gallstone patients the size of the bile salt pool was reduced by 37% to 1.79 g, but there was considerable overlap with the normal subjects. The cholate and chenodeoxycholate pools were reduced, but the deoxycholate pool was normal in size. There were changes in bile salt metabolism which resembled those found after cholecystectomy but were less marked. This suggests that in gallstone disease the storage capacity of the gallbladder is impaired. This may contribute to the small bile salt pool, but it is unlikely to be the sole or even the major cause.

2388 THE COMPLETION CHOLANGIOGRAM: FAILURE TO EMPTY DUE TO PSEUDO-OBSTRUCTION. *(E.)*

Watkins, G. L. (Washington Univ. Sch. Med., St. Louis, Mo.). *Surgery* 74(5):650-653, 1973.

A total of 508 primary and 19 secondary biliary tract operations were reviewed. Of the 177 common duct explorations, stones were found in 85 (48%). Of the 162 completion cholangiograms performed, 14 failed to empty. Of these 14, 12 were cases where stones were found in the common duct, suggesting that the added trauma to the duct system occurring when one finds and removes stones has something to do with the degree of edema or spasm that follows. No reflux was seen in the pancreatic ducts at the time of the completion cholangiograms, in spite of the sometimes considerable intraductal pressure induced by the injection. However, in the majority of cases, pancreatic reflux was seen on postoperative cholangiograms. It is thus suggested that obstruction is not at the ampulla but in the intramural segment of the common duct, probably at the level of the pars superior of the choledochal sphincter, produced by spasm of this sphincter as well as the wall of the duodenum with local edema also causing a significant effect.

2389 INCREASED FORMATION OF URSODEOXYCHOLIC ACID IN PATIENTS TREATED WITH CHENODEOXYCHOLIC ACID. *(E.)*

Salen, G.; Tint, G. S.; Eliav, B.; Beering, N.; Mosbach, E. H. (Manhattan VA Hosp., N.Y.). *J. Clin. Invest.* 53(2):612-621, 1974.

The formation of ursodeoxycholic acid, the 7β-hydroxy epimer of chenodeoxycholic acid, was investigated in 3 subjects with cerebrotendinous xanthomatosis and in 4 with gallstones. Total biliary bile acid composition was analyzed by gas-liquid chromatography before and after 4 months of treatment with chenodeoxycholic acid (0.75 g/day). Individual bile acids were identified by mass spectrometry. Before treatment, bile from cerebrotendinous xanthomatosis subjects contained cholic acid, 85%; chenodeoxycholic acid, 7%; deoxycholic acid, 3%; allocholic acid, 3%; and unidentified steroids, 2%; while bile from gallstone subjects contained cholic acid, 45%; chenodeoxycholic acid, 43%; deoxycholic acid, 11%, and lithocholic acid, 1%. In all subjects, 4 months of chenodeoxycholic acid therapy increased the proportion of this bile acid to approximately 80% and decreased cholic acid to 3% of the total biliary bile acids; the remaining 17% of bile acids were identified as ursodeoxycholic acid. After the i.v. injection of [^{3}H]chenodeoxycholic acid, the specific activity of biliary ursodeoxycholic acid exceeded the specific activity of chenodeoxycholic acid, and the resulting specific activity decay curves suggested precursor-product relation. When [^{3}H]7-ketolithocholic acid was administrated to another patient treated with chenodeoxycholic acid, radioactivity was detected in both the ursodeoxycholic acid and chenodeoxycholic acid fractions. These results indicate that substantial amounts of ursodeoxycholic acid are formed in patients treated with chenodeoxycholic acid, presumably from chenodeoxycholic acid via 7-ketolithocholic acid. These results indicate that substantial amounts of ursodeoxycholic acid are formed in patients treated with chenodeoxycholic acid, presumably from chenodeoxycholic acid via 7-ketolithocholic acid.

2390 CONFIRMATION OF POSTCHOLECYSTECTOMY BILIARY DYSKINESIA BY ELEVATION OF SERUM TRANSAMINASES (GOT AND GPT) AFTER INJECTION OF MORPHINE?

(E.) Holtzer, J. D.; Hulst, S. G. T. (Univ. Hosp., Utrecht, Netherlands). *Acta Med. Scand.* 194(3):221-224, 1973.

The effect of i.m. injection of morphine on the serum concentrations of bilirubin, alkaline phosphatase, GOT, GPT, LDH and amylase has been studied in 39 cholecystomized patients and 62 patients without previous cholecystectomy. Most of the cholecystectomized patients in whom the injection of morphine provoked a reaction of abdominal pain showed increased serum activity of both GOT and GPT 8 hr after the injection of morphine. The results suggest that this morphine-enzyme-pain provocation may be helpful in differentiating dyskinesia of the sphincter Oddi from other postcholecystectomy abdominal complaints.

2391 PHARMACOLOGY OF GENTAMICIN IN THE BILIARY TRACT OF HUMANS.

(E.) Mendelson, J.; Portnoy, J.; Sigman, H. (Jewish Gen. Hosp. Montreal, Canada). *Antimicrob. Agents Chemother* 4(5):538-541, 1973.

Serum and biliary tract levels of gentamicin were determined in 62 patients. Group 1 included 41 who were about to undergo cholecystectomy; group 2 was comprised of 21 who had had cholecystectomies with common bile duct exploration followed by insertion of a T-tube. There were 20 males and 42 females, with ages ranging from 17 to 80 yr. In Group 1, bile was aspirated from the gallbladder at operation at a recorded interval after an i.m. injection of gentamicin. In Group 2, T-tube bile was obtained from the drainage bag which was emptied completely between sampling. The interval in Group 1 between the injection of gentamicin and the sampling of bile and serum ranged from 20 to 120 min. The dose of gentamicin varied from 80 to 120 mg i.m. In only 3 patients studied were serum gentamicin levels greater than 5 μg/ml. The gallbladder gentamicin levels were less than 1 μg/ml in 32 of the 41 patients. Similar ranges in serum gentamicin levels were obtained when 80, 100, or 120 mg of gentamicin was used. No relationship was noted between the gentamicin levels in serum or bile and the time interval between the injection and sampling. In 16 of 21 patients of Group 2 with common duct T-tubes studied, a single dose of gentamicin was given and ranged from 100 to 120 mg i.m. Five additional patients received 120 mg every 8 hr for 4 doses. In the 21 patients studied, only 8 had serum gentamicin levels of 5 μg/ml or greater. No cumulative effect was seen in serum or bile levels when gentamicin was administered every 8 hr for 4 doses. The clinical significance of these data is uncertain, since the importance of high gallbladder bile levels of antibiotic in the medical management of cholecystitis has not been determined.

2392 INTRAHEPATIC ARTERY ANEURYSM ASSOCIATED WITH HEMOBILIA. A CASE REPORT.

(E.) Berenson, M. M.; Freston, J. W. (Univ. Coll. Med., Utah, Salt Lake City). *Gastroenterology* 66(2):254-259, 1974.

The case of a 51-year-old housewife with intermittent upper gastrointestinal hemorrhage beginning 1 month after cholecystectomy is presented. At laparotomy the common bile duct was found to be greatly dilated. Operative cholangiography revealed dilation of the biliary radicles and many radiolucent spots. The bile duct was opened revealing many blood clots. No tumor was found in the pancreas. Four needle biopsies of the liver were obtained which revealed bile stasis and edema in the portal tracts, but no evidence of cholangitis or parenchymal liver disease. Active bleeding was not present, and it was elected to perform a choledochoduodenostomy and ligation of the common hepatic artery proximal to the gastroduodenal artery. The postoperative course was uncomplicated. The patient's liver studies improved, and T-tube cholangiography revealed diminution in the size of the common bile duct. A celiac angiogram obtained postoperatively revealed excellent collateral blood flow via splenic and pancreaticoduodenal arteries which supplied the liver by way of reverse flow through the gastroduodenal artery. Management of intrahepatic aneurysms depends on the nature and the extent of the lesion. Segmental hepatic resection definitively removes the source of bleeding but may be attended by an increased surgical morbidity. Ligation of the hepatic artery proximal to the gastroduodenal artery in this patient has apparently prevented recurrent episodes of hemobilia and restored her hepatobiliary system towards normalcy.

2393 CHOLECYSTOSTOMY: INDICATIONS AND RESULTS.

(E.) Welch, J. P. (Massachusetts Gen. Hosp., Boston). *Br. J. Clin. Pract.* 28(3):79-82, 1974.

394 CHOLESTEROL GALLSTONE DISSOLUTION. CURRENT STATUS. *(E.)* Thistle, J. L. (Mayo Clin., ochester, Minn.). *Arch. Surg.* 107(6):831-832, 1973.

395 BILIARY SURGERY IN THE ELDERLY: THERAPEUTIC MANAGEMENT AND RESULTS. *(Ger.)* Schima, . (Reg. Hosp., Mistelbach/Zaya, Austria). *Wien. lin. Wochenschr.* 85(51):836-839, 1973.

396 FENTANYL AND PRESSURE IN THE COMMON BILE DUCT. *(Fr.)* Tremblay, P.; Poncelet, P.; inh, D. (Univ. Laval Hosp. Ctr., France). *Can. naesth. Soc. J.* 20(6):747-753, 1973.

397 PEER REVIEW OF ACUTE CHOLECYSTITIS. *(E.)* Devitt, J. E.; (Ottawa Civic Hosp., Canada). *an. J. Surg.* 17(1):31-34, 1974.

398 TRIGLYCERIDES, CHOLESTEROL, AND PHOSPHOLIPIDS IN NORMAL HEART PAPILLARY MUSCLE AND N PATIENTS SUFFERING FROM DIABETES, CHOLELITHIASIS, YPERTENSION, AND CORONARY ATHEROMA. *(E.)* Alavaikko, .; Elfving, R.; Hirvonen, J.; Jarvi, J. (Dept. Pathol., niv. Oulu, Finland). *J. Clin. Pathol.* 26(4):285-93, 1973.

399 PAPILLARY CHOLEDOCHODUODENOSTOMY AND PAPILLARY HEPATICOGASTROSTOMY. *(Sp.)* Zamitti ammana, C. (Santa Casa Med. Sch., Sao Paolo, Brasil). *hir. Gastroenterol.* 7(1):97-106, 1973.

2400 CHOLEDOCHAL CYST IN INFANTS. *(E.)* Mahour, G. H. (Childrens Hosp., Los Angeles, Calif.). *Am. J. Dis. Child.* 126:533-534, 1973.

2401 GALLBLADDER DUPLICATION. (PRESENTATION OF 3 CASES). *(Fr.)* Rached-Mohassel, M. A.; Bagheri, F.; Maghsoudi, H.; Nik-Akhtar, B. (Univ. Hosp. Ctr., Teheran, Iran). *Arch. Fr. Mal. App. Dig.* 62(8):679-683, 1973.

2402 THE CHOICE OF A TIME FOR INTERVAL CHOLECYSTECTOMY IN CHOLELITHIASIS WITH CONCOMITANT PANCREATITIS. *(Ger.)* Zimmermann, G.; Laszcz, M.; Boeckl, O. (No affil.). *Munch. Med. Wochenschr.* 115(42):1837-1841, 1973.

2403 EXTRACTION OF RESIDUAL BILIARY CALCULI IN THE X-RAY DEPARTMENT. *(E.)* Light, W. (Queen Mary Vet. Hosp., Montreal, Canada). *J. Can. Assoc. Radiol.* 24(3):209-214, 1973.

2404 ABERRANT PANCREAS IN THE GALLBLADDER. *(E.)* Martinez, L. O.; Gregg, M. (Mt. Sinai Hosp., Miami Beach, Fla.). *J. Can. Assoc. Radiol.* 24(3):234-235, 1973.

See also 1743, 1744, 1752, 1753, 1789, 1792, 1793, 1796, 1809, 1954, 1961, 1964, 1967, 1986, 2015, 2019, 2026, 2028, 2033, 2077, 2266, 2310, 2536, 2548.

GENERAL

405 DETECTION OF A NEW VIRUS BY ELECTRON MICROSCOPY OF FAECAL EXTRACTS FROM CHILDREN ITH ACUTE GASTROENTERITIS. *(E.)* Bishop, R. F.; avidson, G. P.; Holmes, I. H.; Ruck, B. J. (Roy. hildren's Hosp., Melbourne, Australia). *Lancet* 7849):149-151, 1974.

lectron microscopy of negatively stained fecal exracts revealed particles resembling orbiviruses in 1 of 14 children with acute non-bacterial gastroeneritis. No such particles were observed in fecal xtracts from 9 control children. The method of ifferential centrifugation for extraction of feces s simple, quick, and more sensitive than duodenal iopsy for detecting the virus. Combining results rom duodenal mucosa and feces, orbivirus particles ere observed by electron microscopy in 81% of childen with sporadic gastroenteritis in Melbourne. his high frequency shows that this orbivirus is he most important etiological agent in sporadic astroenteritis in children in Melbourne. In morhology and biological characteristics it resembles ery closely the viruses of epizootic diarrhea of nfant mice and calf scours. The need for duodenal iopsy to identify this virus is now eliminated. iming of fecal collection in relation to onset of llness is important. Fecal specimens from 1 child ere positive on day 2 but negative on day 4 of the illness. This technique of fecal extraction will facilitate the epidemiological investigation of the worldwide distribution of this virus.

2406 YERSINIOSIS IN CHILDREN. *(E.)* Delorme, J.; Laverdiere, M.; Martineau, B.; Laflour, L. (Sainte-Justine Hosp. Montreal, Canada). *Can. Med. Assoc. J.* 110(3):281-284, 1974.

Sixty-five strains of *Yersinia enterocolitica* were isolated from stool specimens obtained from 35 patients over a 12-month period. Cultures were made either from a rectal swab or a stool specimen. Of 82 stool cultures from 35 patients, 65 were positive for *Y. enterocolitica.* At least 12 patients had both negative and positive cultures. *Y. enterocolitica* was isolated together with a salmonella species in 2 patients. Strains of *Y. entercolitica* appeared as short gram-negative rods which within 24 hr on SS agar produced tiny lactose-negative, translucent, homogeneous colonies with a hazy rim. The male/female ratio was 1.3:1. Almost 33% of the patients were under 1 yr of age. There was a clearly higher incidence during the months of March, July, and November. The clinical manifestations in *Y. enterocolitica* infections include: acute diarrhea (22 cases), chronic diarrhea (4 cases), nausea and vomiting (12 cases), abdominal pain (6 cases), temperature greater than 101 F (6 cases), and skin rash (2 cases). All patients received only general supportive measures directed to the clinical pattern later found to be caused by *Y. enterocolitica*. Such treatment was followed by a notable improvement within 2 days and in 31 patients complete clinical remission was achieved. In 1 patient, specific treatment with tetracycline was given because of chronicity of the illness and weight retardation. In 2 patients, chloramphenicol was given because the response to the supportive treatment was slow. Yersinia infection in humans involves chiefly the digestive system. Two forms have been described, gastroenteritis and mesenteric lymphadenitis. It is concluded that further North American studies are required to clarify the pathogenicity and epidemiology of this organism.

2407 GASTROINTESTINAL MANIFESTATIONS OF ADVERSE DRUG REACTIONS. *(E.)* Stewart, R. B.; Cluff, L. E. (Coll. Pharm., Univ. Florida, Gainesville). *Am. J. Dig. Dis.* 19(1):1-7, 1974.

Analysis was made of digestive reactions to drugs occurring in hospitalized and nonhospitalized patients. A total of 3164 inpatients were studied, 1583 male and 1581 female, average age 49 yr. The average number of drugs administered per patient was 9.5. Adverse drug reactions of all types were detected in 505 patients (15.9%). Digestive system reactions were detected in 136 (4.3%). White women had a higher incidence of gastrointestinal reactions than did black women, white men or black men. The most common drugs associated with gastrointestinal reactions were potassium chloride syrup, heparin, dioctyl sodium sulfosuccinate, aluminum and magnesium hydroxide suspension, ampicillin, and guanethidine. Potassium chloride syrup was frequently responsible for nausea and vomiting. Aluminum and magnesium hydroxide suspension caused intestinal reactions. heparin caused intestinal bleeding. Women experienced a significantly greater rate of gastrointestinal reactions to levodopa and guanethidine than men. Aspirin was the leading etiological agent responsible for gastrointestinal reactions, followed by digoxin and indomethacin. In a study of 612 outpatients (233 men and 379 women), 83 reactions to drugs affecting the gastrointestinal system were reported with women having a significantly greater share than men. Classes of drugs affecting the gastrointestinal system were nonnarcotic analgesics, narcotic analgesics, and antiinfective drugs, totalling 77.1% of all reactions. It is suggested that the difference in frequency of nausea, vomiting, and diarrhea in men and women may indicate a predisposition of women to these manifestations due to differences in gastrointestinal physiology. It is also suggested that the anxiety and fear inherent in hospitalization itself may produce the more frequent occurrence of abnormal digestive reactions to drugs in hospitalized versus nonhospitalized patients.

2408 INGESTION OF MINERAL ACID. *(E.)* Jelenko, III, C.; Story, J.; Ellison, Jr., R. G. (Med. Coll. Georgia, Augusta). *Am. Surg.* 40(2):97-104, 1974.

Five case histories are presented which discuss the accidental or intentional ingestion of concentrated sulfuric, hydrochloric, or muriatic (commercial grade HCl) acid. The first subjec intentionally ingested muriatic acid. A gastrojejunostomy was performed. The second patient intentionally took hydrochloric acid. An end-to-end gastroileostomy was performed, a tube duodenostomy was placed, a T-tube was inserted in the common duct, and a tracheotomy was performed. He died on his eleventh postoperative day. The third patient accidentally placed approximately one glassful of sulfuric acid in his mouth. He did not swallow, but immediately spat the acid out. He hurriedly washed his mouth with large quantities of water. The severe burns of the entire mucous membrane of the mouth resolved over a 6-day period. The fourth patient mistakenly drank 50% sulfuric acid thinking it was water. He underwent gastrostomy and esophageal dilatation. Retrodilatation of the esophagus was performed subsequently on several occasions, but over a period of 6 days following his gastrostomy he had several episodes of upper gastrointestinal bleeding. The fifth patient accidentally drank a good swallow of 50% sulfuric acid. Exploration revealed the stomach and small bowel down to the ileum to be edematous, dilated and filled with fluid and air. The distal 4 cm of the stomach and proximal 4 cm of the duodenum were resected. The proximal duodenum was closed around a No. 22 French mushroom catheter, the distal stomach was closed, the necrotic areas on the stomach were inverted using interrupted Lembert sutures, and a posterior gastrojejunostomy was performed in the Polya manner. A T-tube was placed in the common duct. Three large Penrose drains were placed in the area of the liver, the area of the anastomosis and in the right gutter. Two Penrose drains were placed, one at the area of the gastroesophageal junction and the other anterior to the gastrojejunostomy. A sump drain was placed in the area of the first part of the duodenum. The following conditions were observed in these 5 patients: strictures of the esophagus, gastroesophageal junction and gastric antrum; coagulation necrosis of the stomach, duodenum, jejunum, and ileum; pancreatitis; omental fat necrosis, and severe peritonitis.

2409 RELATIONSHIP BETWEEN HEPATIC MORPHOLOGY AND CLINICAL AND BIOCHEMICAL FINDINGS IN MORBIDLY OBESE PATIENTS. *(E.)* Manes, J. L.; Taylor, H. B.; Starkloff, G. B. (St. Louis Univ. Med. Ctr., Mo.). *J. Clin. Pathol.* 26(10):776-783, 1973.

The interrelations between clinico-biochemical parameters and hepatic morphology was studied in 166 female and 52 male markedly obese patients. There was a statistically significant association of carbohydrate metabolism disturbance with increasing age and corpulence and, in women, with hyperuricaemia and morphological alterations of the liver. Menstrual irregularities also correlated well with hepatic morphology. The livers frequently exhibited steatosis, but other morphological changes were mild. Compared with women, men had higher triglyceride values, more severe hepatic involvement, and poorer correlation of carbohydrate disturbances with hepatic histology. The results indicate a central role of the impaired carbohydrate utilization in the biochemical and epatic alterations of obesity.

2410 INCREASED JEJUNAL IgA SYNTHESIS IN VITRO DURING ACUTE INFECTIOUS NONBACTERIAL GAS-ROENTERITIS. *(E.)* Agus, S. G.; Falchuk, Z. M.; Sessoms, C. S.; Wyatt, R. G.; Dolin, R. (Natl. Inst. llergy Infect. Dis., Bethesda, Md.). *Am. J. Dig. Dis.* 19(2):127-131, 1974.

Employing a solid-phase immunoadsorbant technique, *n vitro* jejunal IgA production was measured in olunteers before, during, and after infection with he Norwalk agent of acute infectious nonbacterial astroenteritis. In 4 volunteers who became ill with his disease, there was a significant rise in jejunal gA production in convalescent biopsies taken 2 weeks ollowing infection, when compared with changes in he 3 volunteers who did not become ill. The possible ole of local immunity in the response to nonbacter-al gastroenteritis is discussed. Although it is ossible that the early rise in IgA production seen n volunteers may represent an anamnestic response o the Norwalk agent, 2 of these volunteers who howed early rises also developed clinical illness. he clarification of this concept will depend on the evelopment of serologic techniques with which mmunity to agents such as Norwalk can be studied.

411 AN OUTBREAK OF SONNE SHIGELLOSIS IN A POPULATION RECEIVING ORAL ATTENUATED HIGELLA VACCINES. *(E.)* Levine, M. M.; Rice, P. .; Gangarosa, E. J.; Morris, G. K.; Snyder, M. J.; ormal, S. B.; Wells, J. G.; Gemski, P., Jr.; ammond, J. (Ctr. Dis. Control., Atlanta, Ga.). *Am. . Epidemiol.* 99:30-36, 1974.

412 DUODENAL BACTERIAL FLORA AND BILE SALT PATTERNS IN PATIENTS WITH GASTROINTESTINAL ISEASE. *(E.)* Campbell, C. B.; Cowen, A. E.; arper, J. (Roy. Brisbane Hosp., Herston, Australia). *ust. N.Z. J. Med.* 3(4):339-348, 1973.

413 PRIMARY LYMPHOSARCOMA OF THE PAROTID GLAND. *(E.)* Seligman, B. R.; Rosner, F.; Daven-ort, J. (Queens Hosp., N.Y.). *Cancer* 33(1):239-43, 1974.

414 RECENT VIEWS ON ZOLLINGER-ELLISON SYNDROME. *(Fr.)* Bonfils, S. (Hosp. Bichat, Paris, rance). *Chirurgie* 99(1):28-30, 1973.

415 ACRODERMATITIS ENTEROPATHICA: CLINICAL SYMPTOMS, LIFESAVING TREATMENT, BLINDNESS AUSED BY THERAPY. *(Ger.)* Reich, H. (Opthalmol. lin., Univ. Munster, Germany). *Dtsch. Med. Wochenschr.* 8(36):1673-1676, 1973.

416 ENDOSCOPIC SPHINCTEROTOMY OF THE PAPILLA OF VATER AND EXTRACTION OF STONES FROM THE OMMON BILE DUCT. *(Ger.)* Classen, M.; Demling, L. (Med. Clin., Univ. Erlangen, Germany). *Dtsch. Med. Wochenschr.* 99(11):496-497, 1974.

2417 STUDIES ON TOXINOGENESIS IN VIBRIO CHOLERAE. II. AN IN VITRO TEST FOR ENTEROTOXIN PRODUCTION. *(E.)* Vasil, M. L.; Holmes, R. K.; Finkelstein, R. A. (Univ. Texas Southwestern Med. Sch., Dallas). *Infect. Immun.* 9(1):195-197, 1974.

2418 CHOLERA. IMPLICATIONS FOR THE UNITED STATES. *(E.)* Gangarosa, E. J.; Barker, W. H. (Bacterial Dis. Br., USDA., Atlanta, Ga.). *J.A.M.A.* 227(2):170-171, 1974.

2419 ONCOCYTIC AND ONCOCYTOID TUMORS OF THE SALIVARY GLANDS. *(E.)* Johns, M. E.; Batsakis, J. G.; Short, C. D. (Univ. Michigan Med. Ctr., Ann Arbor). *Laryngoscope* 83(12):1940-1952, 1973.

2420 HEMANGIOPERICYTOMA OF THE PAROTID GLAND: A CASE REPORT WITH AUTOPSY. *(E.)* Neal, T. F.; Starke, W. R. (Fitzsimons Gen. Hosp., Denver, Colo.). *Laryngoscope* 83(12):1953-1958, 1973.

2421 ULTRASTRUCTURAL FINDINGS IN ACRODERMATITIS ENTEROPATHICA. *(E.)* Lombeck, I.; Von Bassewitz, D. B.; Becker, K.; Tinschmann, P.; Kastner, H. (Univ. Child. Hosp., Munster, Germany). *Pediatr. Res.* 8(2):82-88, 1974.

2422 TRIGLYCERIDE CLEARING IN GLYCOGEN STORAGE DISEASE. *(E.)* Forget, P. P.; Fernandes, J.; Haverkamp Begemann, P. (Sophia Children's Hosp., Rotterdam, Netherlands). *Pediatr. Res.* 8(2): 114-119, 1974.

2423 TUMOURS OF THE ALIMENTARY CANAL. *(E.)* Templeton, A. C. (no affil.). *Recent Results Cancer Res.* 41:23-56, 1973.

2424 SALIVARY GLAND TUMORS: HISTOPATHOLOGY AND CLINICAL COURSE. *(Jap.)* Baba, K.; Washizu, F.; Ebihara, T.; Ono, I.; Shimosato, Y.; Takeda, C. (Natl. Cancer Ctr., Tokyo, Japan). *Jap. J. Cancer Clin.* 19(9):893-911, 1973.

2425 INCIDENCE AND COURSE OF STAPHYLOCOCCAL INTESTINAL INFECTION IN CHILDREN. *(Rus.)* Klochko, K. N.; Arsky, V. G.; Gutorova, L. D.; Meitus, I. E.; Ostapenko, E. A.; Rozman, E. Y. (Dushanbe Inst. Epidemiol. Hyg., USSR). *Zdravookhr. Tadzhik.* (5):27-31, 1973.

2426 ETIOLOGICAL ASPECTS OF NECROTIZING ENTEROCOLITIS. *(Fr.)* Neidhardt, J. H.; Lesbros, F.; Morin, A.; Moulin, R.; Cuche, P.; Chadenson, O.; Bouletreau, P.; Grandjean, J. P.; Ghazzi, J.; Liaras,

H. (Edouard Herriot Hosp., Lyon, France). *Lyon Chir.* 69(6):410-418, 1973.

2427 DETECTION OF THE ANTIGENS OF THE CAUSATIVE AGENT OF TYPHOID FEVER IN THE EXCRETA OF PATIENTS AND IN WASHINGS FROM OBJECTS. *(Rus.)* Levi, M. I.; Stepanova, S. L.; Egorova, M. N.; Mityushina, N. I.; Efimova, A. N.; Vinogradova, A. D.; Stepanova, E. I. (Moscow Munic. Disinfection Sta., USSR). *Zh. Mikrobiol. Epidemiol.* 50(5):25-28, 1973.

2428 DIGESTIVE SYSTEM AND METABOLIC DISEASES. *(Cz.)* Syllaba, J. (no affil.) *Cesk. Gastroenterol. Vyz.* 27(4):255-262, 1973.

2429 DIAGNOSIS AND TREATMENT OF THE ZOLLINGER-ELLISON SYNDROME. *(Fr.)* Moreaux, J.; Martin, M. (Bichat Hosp., Paris, France). *Chirurgie* 99(1):31-39, 1973.

2430 BLOOD LOSS FROM THE GASTROINTESTINAL TRACT IN SOME IRON-DEFICIENCY ANEMIAS. *(Cz.)* Neuwirtova, R.; Setkova, O.; Reinisova, J.; Chrzova, V. (Fac. Gen. Med., Charles Univ., Prague, Czechoslovakia). *Vnitr. Lek.* 19(4):320-326, 1973.

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GENERAL

Parasitology

2521 PSEUDOLYMPHOMAS OF THE COLON: TWO CASES. *(Fr.)* Khouri, K.; Ferneini, S.; Tabbara, W. (Hotel Dieu de France, Beirut, Lebanon). *J. Med. Liban* 26(4):407-424, 1973.

A 37-yr-old Palestinian woman whose daughter had died of Burkitt's lymphoma developed chronic diarrhea which was refractory to drug treatment. Rectal biopsy showed a nonspecific inflammatory lesion containing a cyst-like structure which may have been parasitic although stools were negative for parasites. Metronidazole and salicylazosulfapyridine caused normalization of transit time and disappearance of abdominal pain, but diarrhea recurred and a hard mass the size of an orange appeared in the right iliac fossa. Symptomatic and radiological improvement occurred and the erythrocyte sedimentation rate decreased with dehydroemetine. Further improvement occurred with ampicillin (1.5 g/day), metronidazole, and chloroquine, but the abdominal mass remained unchanged. At surgery a tumor 15 cm long was removed from the ascending colon. Histological findings were compatible with a pseudolymphomatous form of colitis. Continued improvement occurred with salicylazosulfapyridine maintenance except for epigastric cramps which developed during family difficulties. These cramps responded to antacids and anticholinergic agents. Mediterranean lymphoma was ruled out by the absence of heavy α-chains. A 33-yr-old Palestinian man with a history of dysentery dating back 4-5 yr had a painful mass to the left of the umbilicus and radiological findings compatible with a primary or invasive lymphoma in the transverse colon. Histological examination of the resected mass showed segmental ulcerative colitis and lymphoid hyperplasia with chronic lymphadenitis. Although the histories in both of these cases are suggestive of amebomas, histological findings are not consistent with this diagnosis.

2522 STUDIES OF HUMAN AMEBIASIS. III. AMEBOMA: A RADIOLOGIC MANIFESTATION OF AMEBIC COLITIS. *(E.)* Pittman, F. E.; Pittman, J. C.; El-Hashimi, W. K. (Med. Univ. South Carolina, Charleston). *Am. J. Dig. Dis.* 18(12):1025-1031, 1973.

Four patients (2 males and 2 females, aged 19-50 yr) with well-documented amebic colitis had colonic deformities suggestive of ameboma. Barium enema examination showed that each of the 4 had cecal coning and 1, an additional sigmoid lesion. Only 1 patient with a cecal lesion had a palpable, tender mass in the right lower quadrant. Indirect hemagglutination tests for amebiasis were positive in all cases. Treatment with a low-dose metronidazole regimen (250 mg, 3 times/day for 7-10 days) produced clinical and parasitologic cure in 2 cases. In 1 case a second course of metronidazole (500 mg/3 times/day for 10 days) was required for clinical cure and a third course (750 mg, 3 times/day for 10 days) for parasitologic cure. The patient presenting with the right lower quadrant mass received a second 10-day course of 750 mg metronidazole due to recurrent tenderness in this area and persistence of the cecal deformity. Subsequent physical examination failed to reveal a palpable mass. Barium enema with air contrast demonstrated more complete filling of the cecum. Marked radiologic improvement was observed in the 2 other patients available for follow-up. Since ameboma may be confused with carcinoma, a search for amebae in stool and an indirect hemagglutination test for amebiasis can prevent unnecessary and potentially disastrous surgery.

2523 MEBENDAZOLE IN ENTEROBIASIS. A PLACEBO-CONTROLLED TRIAL IN A PAEDIATRIC COMMUNITY. *(E.)* Fierlafijn, E.; Vanparijs, O. F. (Jannsen Pharmaceutica, Beerse, Belgium). *Trop. Geogr. Med.* 24(3):242-244, 1973.

Of 65 children treated with mebendazole (100 mg), 43 were positive for *Enterobius vermicularis* prior to medication, while only 4 were positive after treatment. In a group of 65 children treated with placebo, the number of positive children was 41 before and 42 after treatment. Of 40 positive children whose first medication was placebo, 39 were negative consequent to mebendazole medication. The cure rate for the drug, based on the 83 microscopically positive children, was 94%. Mebendazole was exceptionally well tolerated; no side effects were observed despite the fact that the same dosage was given to all children regardless of weight or age (2-1/2 yr to 8 yr 10 months).

2524 THE ACCIDENTAL DISCOVERY THAT SODIUM DIATRIZOATE (HYPAQUE) INFUSION WILL VISUALIZE AMEBIC ABSCESSES ON HEPATIC TOMOGRAMS. *(E.)* Chang, S.; Hildebrandt, W.; Silvis, S. E. (VA Hosp., Minneapolis, Minn.). *Am. J. Trop. Med. Hyg.* 23(1):31-34, 1974.

Two cases of successfully treated amebic liver abscess are reported in which hepatic tomograms following i.v. infusion of sodium diatrizoate visualized the walls of amebic abscesses. The first case was of a 25-yr-old male. Plain abdominal X-ray films showed a questionable irregularity of the upper pole of the right kidney and a slightly enlarged liver. Barium enema was normal. The liver scan with technetium^{99} M sulfur colloid revealed a large area of poor uptake in the right lobe. Nephrotomograms revealed a normal right kidney; but a large cystic structure in the hepatic area was seen in the 6 through 18 cm planes. The area appeared consistent with the filling defect on the liver scan. The patient was started on emetine and chloroquine, which was followed by rapid improvement of the symptoms. The second case was a 23-yr-old male. Prompt clinical response to emetine and chloroquine strongly supported the diagnosis of amebic abscess. Hepatic tomograms with i.v. infusion of sodium diatrizoate showed a round area of radiolucency in the right lobe of the liver surrounded by a narrow radiopaque band. Both the cases had had colitis in South Vietnam. The diagnosis of amebic liver abscess in the 2 cases is well established with the history of amebic colitis, abnormal hepatic scan, and the immediate responses to therapy.

2525 PENICILLAMINE AS AN ADJUVANT TO ANTIMONIAL THERAPY OF SCHISTOSOMIASIS: EFFECT ON LIVER FUNCTION TESTS IN RABBITS AND ON ANTISCHISTOSOMAL ACTIVITY. *(E.)* Khayyal, M. T.; Saleh, S.; El Masri, A. M. (Fac. Pharm., Cairo Univ., Egypt). *Bull. W.H.O.* 48(4):415-420, 1973.

The possible protective effect of penicillamine on the hepatic toxicity of antimonyl potassium tartrate was investigated in male rabbits. Tests of liver function showed changes in the level of serum aspartate and alanine aminotransferase and of alkaline phosphatase, and in the beta-/alpha-lipoprotein ratio, in response to antimony treatment. The changes were significantly reduced by penicillamine, though the effect depended on the dose. Penicillamine was found to give the best overall protection without affecting the antischistosomal efficacy of the antimonial when a 1:2 antimonyl potassium tartrate/penicillamine ratio was used. The findings provide further evidence of the potential usefulness of penicillamine in the antimonial treatment of schistosomiasis.

2526 IMMUNITY TO FASCIOLA HEPATICA IN RATS: THE EFFECT OF TWO DIFFERENT LEVELS OF PRIMARY EXPOSURE ON SUPERINFECTION. *(E.)* Hayes, T. J.; Bailer, J.; Mitrovic, M. (Hoffmann-La Roche, Inc., Nutley, N.J.). *J. Parasitol.* 59(5):810-812, 1973.

The effect of minimal infection with *F. hepatica* (1 metacercaria/rat) on a challenge infection was studied and compared with a higher level of infection (10 metacercariae/rat). Seventy-six percent fewer flukes developed from a challenge infection in rats with an existing infection of one *F. hepatica* than in rats not previously exposed. Rats first exposed to 10 metacercariae were able to resist completely a challenge exposure. Existing fluke burdens from the primary exposure were not significantly affected by challenge. The results corroborate and extend an earlier study on immunity to superinfection with *F. hepatica* in rats, and the ability of one existing fluke to cause a marked reduction from challenge is taken to indicate that nonspecific liver inflammation and damage existing at the time of challenge may not play a necessary role in immunity to *F. hepatica* in rats.

2527 AMEBIASIS: NEWER METHODS OF DIAGNOSIS AND TREATMENT. *(E.)* DeFord, J. W. (Univ. Florida Coll. Med., Gainesville). *S. Med. J.* 66(10):1149-1153, 1973.

2528 AMEBIASIS PRESENTING AS AN ACUTE ABDOMEN. *(E.)* Judy, K. L. (Moncrief Army Hosp., Fort Jackson, S.C.). *Am. J. Surg.* 127(1):275-279, 1974.

2529 TREATMENT AND CHEMOPROPHYLAXIS OF INTESTINAL PROTOZOOSIS IN A COMMUNITY USING METRONIDAZOLE. *(Sp.)* Schenone, H.; Donoso, F.; Suarez, E. G.; Soto, V.; Galdames, M.; Inzunza, E.; Doren, G.; Jimenez, M.; Romero, E. (Dept. Microbiol., Univ. Chile, Santiago). *Bol. Chil. Parasitol.* 29(3-4):104-105, 1973.

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2531 IN VIVO EFFECTS OF A NEW ANTHELMINTIC, MEBENDAZOLE (R-17,635) ON THE EGGS OF TRICHURIS TRICHIURA AND HOOKWORM. *(E.)* Wagner, E. D.; Chavarria, A. P. (Loma Linda Univ., Dept. Microbiol., Calif.). *Am. J. Trop. Med. Hyg.* 23(2):151-153, 1974.

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2533 AMOEBIC PERFORATION OF THE COLON. *(E.)* Prakash, A.; Sharma, L. K.; Pandit, P. N. (All-India Inst. Med. Sci., New Delhi). *Br. J. Surg.* 61(2):162-164, 1974.

2534 HEALING OF AMEBIC LIVER ABSCESS. *(E.)* Ramachander Rao, S.; Murthy, K. J. R.; Chandramouli, C. (Inst. Med. Sci., Osmania Med. Coll., Hyderabad, India). *Am. J. Gastroenterol.* 60(4):372-378, 1973.

2535 INTESTINAL HELMINTHS IN CHILDREN IN COASTAL SOUTH CAROLINA: FOLLOW-UP REPORT. *(E.)* Dudley, B. W.; Lease, E. J. (Malnutrition Parasite Project, Univ. South Carolina, Columbia). *S. Med. J.* 66(10):1100, 1126, 1973.

2536 PARASITIC GRANULOMATOUS CHOLECYSTITIS THAT APPEARED TO BE TUMORAL. *(Sp.)* Sapunar, J.; Castillo, P.; Diaz, M. (Dept. Microbiol., Univ. Chile, Santiago). *Bol. Chil. Parasitol.* 28(3-4):91-95, 1973.

2537 HEPATIC AMEBIASIS WITH SCINTIGRAPHIC DEFECTS. METRONIDAZOLE THERAPY. (PRESENTATION OF 15 CASES). *(Fr.)* Monges, H.; Andre, L. J.; Remacle, J. P.; Barabe, P. (Hosp. Nord, Marseille, France). *Arch. Fr. Mal. App. Dig.* 62(8):655-662, 1973.

2538 HEPATIC CALCIFICATION DUE TO FASCIOLA GIGANTICA. *(E.)* Grange, D.; Dhumeaux, D.; Couzineau, P.; Bismuth, H.; Bader, J. P. (Paul Brousse Hosp., Villejuif, France). *Arch. Surg.* 108(1):113-115, 1974.

2539 MASS-TREATMENT OF TRICHURIASIS WITH SEVERAL ANTHELMINTICS, ESPECIALLY ON THE STATISTICAL CRITERIA FOR THE EVALUATION OF EGG-DIMINISHING EFFECTS OF THE DRUG. *(E.)* Shiraki, T.; Otsuru, M.; Hotta, T.; Suzuki, T.; Sekikawa, H.; Kenmotsu, M.; Hashimoto, T. (Niigata Univ. Sch. Med., Japan). *Acta Med. Biol.* 21(1):11-27, 1973.

2540 CAROTENEMIA OF PARASITIZED ANIMALS. I. CAROTENEMIA OF SHEEP PARASITIZED BY GASTROINTESTINAL NEMATODES BELONGING TO THE TRICHOSTRONGYLIDAE FAMILY. *(It.)* Tamas, V.; Angi, E.; Suteu, A. E. (No affil.). *Stud. Cercet. Biochim.* 16(3):309-312, 1973.

2541 ALLERGIC HEPATITIS IN PATIENTS WITH LIVER ECHINOCOCCOSIS. *(E.)* Triolo, G.; Filipazzo, M. G.; Genova, G.; Pinzello, G.; Pagliaro, L. (Dept. Med., Univ. Palermo, Italy). *Rendic. Gastroenterol.* 5(2):97-99, 1973.

2542 FASCIOLIASIS CAUSING JAUNDICE AND INTESTINAL BLEEDING. *(E.)* Goodman, M. A.;

Henderson, J. I.; Cullity, G. J. (Princess Margaret Hosp. Children, Perth, Australia). *Med. J. Aust.* (11):547-550, 1973.

2543 AMOEBICIDAL ACTION OF BILE SALTS AND OTHER SURFACE-ACTIVE AGENTS ON AXENICALLY GROWN ENTAMOEBA HISTOLYTICA. *(E.)* Dutta, G. P.; Yadava, . N. S. (Central Drug. Res. Inst., Lucknow, India). *Indian J. Med. Res.* 61(8):1124-1126, 1973.

2544 PATHOPHYSIOLOGICAL AND TOXICOLOGICAL ASPECTS OF SCHISTOSOMA MANSONI INFECTION IN MASTOMYS NATALENSIS RECEIVING CHEMOTHERAPHY WITH HYCANTHONE. *(Ger.)* Schuster, J.; Lammler, G.; Rudolph, R.; Zahner, H. (Inst. Parasitol. Parasitic Dis. Animals, Justus Liebig Univ., Giessen, Germany). *Z. Tropenmed. Parasitol.* 24(4):487-499, 1973.

2545 INTESTINAL PARASITISM AND NUTRIENT ABSORPTION. *(E.)* Turk, D. E. (Nutrition Fac., Clemson Univ., S. C.). *Fed. Proc.* 33(1):106-111, 1974.

2546 ARTERIOGRAPHIC DEMONSTRATION OF HYDATID CYSTS OF THE LIVER. CALCIFIED HYDATID CYSTS AND PNEUMOCYSTS. (III). *(Sp.)* Muro, J.; 117(29):1085-1088, 1973.

2547 ARTERIOGRAPHIC DEMONSTRATION OF HYDATID CYSTS OF THE LIVER. CALCIFIED HYDATID CYSTS AND PNEUMOCYSTS. (III). *(Sp.)* Muro, J.; San Martin, P.; Ortiz-Vazquez, J.; Diago, A.; Cosme, A. (La Paz Clin., Madrid, Spain). *Med. Clin. (Barc.)* 60(1):7-14, 1973.

See also 1915, 1941, 1966, 2023, 2445, 2496.

GENERAL

Regional Enteritis

548 GALLSTONES IN INFLAMMATORY BOWEL DISEASE. *(E.)* Baker, A. L.; Kaplan, M. M.; Norton, . A.; Patterson, J. F. (New England Med. Ctr. Hosp., Boston Mass.). *Am. J. Dig. Dis.* 19(2):109-112, 1974.

Chronic disease of the terminal ileum is associated with a high prevalence of gallstones. To decide whether the ileal location of the disease is responsible for this finding, we determined the prevalence of gallstones in 189 patients with all types of inflammatory bowel disease. The prevalence of gallstones in patients with disease involving the terminal ileum (regional enteritis and granulomatous ileocolitis) was 28.2% compared to a prevalence of 3.1% in patients with inflammatory bowel disease confined to the colon (ulcerative colitis and granulomatous colitis). The prevalence of gallstones in a hospital comparison population, age and sex matched to the regional enteritis-granulomatous ileocolitis group, was 11.7%. In patients with disease of the ileum, the presence of gallstones was correlated with the length of ileum involved, ileal resection, and duration of disease. The data suggest that the ileal location of the disease is of major importance. The high prevalence of gallstones found in the patients with regional enteritis and granulomatous ileocolitis, and the correlation between length of ileal involvement and gallstones, support the current concept of gallstone formation. Since the primary site for the absorption of bile salts is the terminal ileum, regional enteritis and granulomatous ileocolitis might cause a chronic loss of bile salts from the body, and in turn, a decreased cholesterol solubilizing capacity of gallbladder bile.

2549 ARTHRITIS AND CROHN'S DISEASE. A FAMILY STUDY. *(E.)* Haslock, I. (Dept. Med., Univ. Leeds, England). *Ann. Rheum. Dis.* 32(6):479-486, 1973.

A study was undertaken of the articular diseases of 116 patients with Crohn's disease and the families of 98 of them. Of the probands, 24 (20.7%), were diagnosed as having enteropathic synovitis. This was an episodic polysynovitis affecting large rather than small joints and lower limb rather than upper limb joints. The synovitis almost invariably accompanied or followed the onset of intestinal symptoms and showed a tendency to be associated with exacerbations of the disease and to be ameliorated by surgery. Radiological sacroilitis was found in 19 patients, of whom 8 (6.9%) had clinical ankylosing spondylitis. Five of these had an associated peripheral arthritis. In contrast to the enteropathic synovitis, neither the onset nor the course of the spondylitis had any relationship to the onset and course of the intestinal disease. Radiological sacroilitis was found in 8.3%, of the first-degree and 1.9% of the second-degree relatives. The articular complications of Crohn's disease are common, and are probably the commonest extraintestinal manifestation of the disease. Enteropathic synovitis appears to be a complication of active gut disease, whereas ankylosing spondylitis appears to be an hereditary accompaniment.

2550 AN EPIDEMIOLOGIC AND DEMOGRAPHIC STUDY OF INFLAMMATORY BOWEL DISEASE IN BLACK PATIENTS. *(E.)* Samuels, A. D.; Weese, J. L.; Berman, P. M.; Kirsner, J. B. (Dept. Med., Univ. Chicago, Ill.). *Am. J. Dig. Dis.* 19(2):156-160, 1974.

An analysis of inflammatory bowel disease in black people is presented and compared with a similar analysis of 1,557 patients at the University of Chicago. The diagnoses of the 58 blacks with inflammatory bowel disease included: ulcerative colitis and proctitis; regional enteritis; and ileocolitis. The most frequent age at onset of ulcerative colitis was 20 to 29 yr. The most frequent age at onset of regional enteritis was 10 to 19 yr: a secondary peak was noted in the 30-39 yr range. The most frequent age of onset of ileocolitis was 20 to 29 yr. The most frequent age at onset of granulomatous inflammation was 10 to 19 yr. The ratios of females to males are: 2:1 in regional enteritis, 1:1 in ileocolitis; and 1.56:1 for Crohn's disease. Eleven percent in the ulcerative colitis, and 30% in the Crohn's disease patients, were unskilled laborers. In ulcerative colitis, arthritic symptoms and peptic ulcers occurred at a significantly higher rate in blacks. In Crohn's disease, blacks were statistically more likely to develop fissures. Drug reactions and urinary tract infections were also more common in blacks than in the entire white project group. Blacks who present with inflammatory bowel disease are more likely to be better educated. The major manifestations of ulcerative colitis and Crohn's disease are comparable in blacks and the entire project population. The more frequent occurrence of complications of the disease among blacks is of note.

2551 STUDIES ON CROHN'S DISEASE. II. IMMUNOGLOBULIN-CONTAINING CELLS IN THE TERMINAL ILEUM. *(E.)* Persson, S.; Danielsson, D. (Regionsjukhuset, Orebro, Sweden). *Acta Chir. Scand.* 139(8):735-738, 1973.

The numbers of immunoglobulin-containing cells in the mucosa of terminal ileum were counted by a direct immunofluorescence (IFL) technique in resected tissue from 10 patients with Crohn's disease, and from 6 patients operated on for other disorders with this part of the intestine not inflamed. In the control patients, IgA-containing cells were predominant in all specimens with a ratio of IgA:IgG varying between 30.3 to 1.3 and of IgA:IgM between 9.6 to 1.7. Beside the staining of immune cells, IFL staining was also obtained of the mucus outside the epithelial cells and also in epithelial crypts. Obvious inflammatory signs were noted in sections of the terminal ileum from the patients with Crohn's disease. Immunoglobulin-containing cells located in the lamina propria were counted. The ratio of IgA:IgG varied from 0.3 to 1.6. The ratio of IgA:IgM varied from 0.7 to 9.0. The number of immunoglobulin-containing cells were considerably greater in the specimens from the patients with Crohn's disease than in the specimens from the controls. IGG- and IgA-containing cells dominated over IgM-containing cells. In a few patients, a heavy IFL staining of IgG-containing cells was observed in certain granulomas giving the impression of an active germ center. The findings in this study indicate a strong disturbance in the normal balance between the ratio of IgA: IgG-containing cells in the mucosa of the terminal ileum with Crohn's disease. The observations indicate that the IgA defense line has been broken and that the IgG-IgM system is activated in a way typical for an antigenic stimulation of non-mucosal tissue.

2552 KVEIN TEST AND LYMPHOCYTE TRANSFORMATION TEST IN CROHN'S DISEASE. *(Pol.)* Piotrowski, M.; Bartnik, W.; Zych, D. (Acad. Med., Warsaw, Poland). *Pol. Arch. Med. Wewn.* 50(5):467-473, 1973.

2553 TERMINAL ILEITIS AND TAKAYASU'S DISEASE. *(Fr.)* Bigot, R.; Gateau, P.; Chermet, J.; Doyon, D.; Monnier, J. P. (St. Antoine Hosp., Paris, France). *Ann. Radiol. (Paris)* 16(11/12): 767-771, 1973.

See also 1987, 2258, 2260.

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GOMES PINTO, B.
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GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized complilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *World Medical Periodicals*, 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	It.	Italian
Ar.	Arabic	Jap.	Japanese
Bul.	Bulgarian	Kor.	Korean
Ch.	Chinese	Latv.	Latvian
Cz.	Czech	Lith.	Lithuanian
Dan.	Danish	Nor.	Norwegian
Dut.	Dutch	Pol.	Polish
E.	English	Por.	Portuguese
Eston.	Estonian	Rum.	Rumanian
Fin.	Finnish	Rus.	Russian
Fl.	Flemish	Ser.	Serbo-Croatian
Fr.	French	Sl.	Slovak
Ger.	German	Sp.	Spanish
Gr.	Greek	Sw.	Swedish
Heb.	Hebrew	Th.	Thai
Hun.	Hungarian	Turk.	Turkish
Ic.	Icelandic	Uk.	Ukrainian
In.	Indonesian	Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	mC,μC	milli-,microcurie(s)
ADP	adenosine diphosphate	mg	milligram(s)
AMP	adenosine monophosphate	min	minute(s)
ATP	adenosine triphosphate	ml	milliliter(s)
BSP	sulfobromophthalein	mm	millimeter(s)
C	degrees centigrade	MTD	maximum tolerated dose
cm	centimeter(s)	ng	nanogram (10^{-9})
CNS	central nervous system	pg	picogram (10^{-12})
cpm	counts per minute	p.o.	orally
DNA	deoxyribonucleic acid	ppm	parts per million
e.g.	for example	r	Roentgen
g	gram(s)	RBC	red blood cells (erythrocytes), red blood count
μg	microgram(s)	resp.	respectively
hr	hour(s)	Rev.	review (only in citations)
i.m.	intramuscular	RNA	ribonucleic acid
i.p.	intraperitoneal	s.c.	subcutaneous
IU	international unit(s)	sec	second(s)
i.v.	intravenous	SGOT	serum glutamic-oxalacetic transaminase
kg	kilogram(s)	SGPT	serum glutamic-pyruvic transaminase
LD_{50}	median lethal dose(s)	U	unit(s)
LDH	lactic acid dehydrogenase	UV	ultraviolet
m	meter(s)	WBC	white blood cells (leukocytes), white blood count
M	molar	yr	year(s)
mEq	milliequivalent(s)		
mM	millimolar		
μM	micromolar		

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

554 CYTOCHEMISTRY OF GOLGI FRACTIONS PREPARED
FROM RAT LIVER. *(E.)* Farquhar, M. G.;
ergeron, J. J. M.; Palade, G. E. (Yale Univ. Sch.
f Med., New Haven, Connecticut). *J. Cell Biol.*
)(1):8-25, 1974.

ytochemical tests for several marker enzymes were
pplied to liver tissue and to the three Golgi frac-
ions (GF_1, GF_2, GF_3) separated by the procedure
f Ehrenreich et al. from liver homogenates of alco-
ol treated male Sprague-Dawley rats. 5'-Nucleoti-
ase (AMPase) reaction product was found in all
hree fractions but in different locations: It oc-
urred along the inside of the membrane of VLDL-
illed vacuoles in GF_1 and GF_2, and along the out-
ide of the cisternal membranes in GF_3. In the latter
t was restricted to the dilated cisternal rims and
as absent from the cisternal centers. The AMPase
ctivity found in the fractions by biochemical as-
ay is therefore indigenous to Golgi components and
s not due to contamination by plasma membrane. Acid
hosphatase (AcPase) reaction product was detected
ithin lysosomal contaminants in GF_1 and within many
LDL-filled vacuoles in GF_1 and GF_2, indicating that
cPase activity is due not only to contaminating
ysosomes, but also to enzyme indigenous to Golgi
ecretory vacuoles. G-6-Pase reaction product was
resent in GF_3 and within contaminating endoplasmic
eticulum fragments, but not in other fractions.
hiamine pyrophosphatase (TPPase) was localized to
ome of the VLDL-filled vacuoles and cisternae in
F_1 and GF_2, and was not found in the cisternae in
F_3. The results demonstrate the usefulness of cyto-
hemical methods in monitoring the fractionation
rocedure: They have (*a*) allowed a reliable identi-
ication of contaminants, (*b*) made possible a dis-
inction between indigenous and contaminating ac-
ivities, and (*c*) shown, primarily by the results of
he TPPase test, that the procedure achieves a mean-
ngful subfractionation of Golgi elements, with GF_1
nd GF_2, representing primarily trans-Golgi elements
rom the secretory Golgi face, and GF_3 consisting
argely of cis-Golgi components from the opposite
ace.

55 GALLBLADDER AND BILE DUCT ULTRASTRUCTURE.
IV. CHOLESTEROSIS OF THE HUMAN GALLBLADDER
JCOSA. *(Ger.)* Luciano, L.; Wolpers, C. (Med. Coll.,
annover, Germany). *Virchows Arch (Zellpathol.)*
(2):147-158, 1973.

trastructural examinations were made of chief cells
the epithelium and connective tissue cells in the
amina propria of gallbladders removed from 3 fe-
ale patients, aged 28, 44, and 68 yr. A well-de-
eloped smooth endoplasmic reticulum was found in
he chief cells of the epithelium. Many macropha-
es were found between the epithelial cells and in
he lamina propria, and some of these macrophages
ere entering or leaving the basement membrane.
ome of the intraepithelial macrophages contained
lattened, smooth-surfaced cisternae connected
ith the rough endoplasmic reticulum. These smooth-
irfaced cisternae were more numerous and larger
in other macrophages located next to the epithelium in the lamina propria. As the distance from the epithelium increased, these structures became larger and finally resembled foam cell vacuoles, but freeze-etching showed that they contained lipids. The highly developed smooth endoplasmic reticulum in both epithelial cells and macrophages suggests that this structure is involved in lipid transport or deposition. Morphological differences between the "vacuoles" might be due to differences in their lipid content or to temperature differences which aid in the solution of this problem.

2556 STRUCTURAL DIFFERENCE BETWEEN LUMINAL AND LATERAL PLASMALEMMA IN PANCREATIC ACINAR CELLS. *(E.)* DeCamilli, P.; Peluchetti, D.; Meldolesi, J. (Dept. Pharmacol., Univ. Milan, Italy). *Nature* 248(5445):245-247, 1974.

Small pancreas tissue fragments from male albino guinea pigs were freeze-fractured. Large areas of both the luminal and lateral plasmalemma were exposed by cleavage. After cleavage, most of the particles are associated with the half of the membrane left frozen to the cytoplasm (the A face). The face of the half membrane left frozen to the extracellular space (the B face) bears fewer particles/unit area. In pancreatic acinar cells, the typical A face pattern can be found only in the basal and lateral portions of the plasmalemma (including the regions close to the tight junctions and within the chambers delimited by their network). Over the entire luminal area, there are far fewer particles/unit area of the A face. The transition is very sharp across the inner continuous line of the tight junction delimiting the lumen. On the B face the number of particles is always very small, with no clear difference between the luminal and the lateral portions of the plasmalemma. The limiting membranes of the zymogen granule stored within the cells bear many fewer particles/unit area than the membranes of the other cytoplasmic organelles. The distribution is again asymmetrical with more particles in the A face than in the B face. It is suggested that the zymogen granule membranes and the luminal portion of the plasmalemma might be part of a unique pool of membranes which are continuously shuttled backward and forward between the newly formed zymogen granule and the luminal surface.

2557 ON THE SPATIAL ARRANGEMENT OF PROTEINS IN MICROSOMAL MEMBRANES FROM RAT LIVER. *(E.)* Kreibich, G.; Hubbard, A. L.; Sabatini, D. D. (New York Univ. Sch. Med., N.Y.). *J. Cell Biol.* 60(3): 616-627, 1974.

Rat liver rough microsomes were labeled enzymatically with ^{125}I using lactoperoxidase and glucose oxidase. In intact microsomes only proteins exposed on the outside face of the microsomal membrane were iodinated. Low concentrations of detergent (0.049% deoxycholate) were used to allow entrance of the iodination system into the vesicles without disassembling the membranes. This led to iodination of the soluble content proteins and to an increased labeling of the membrane proteins. The distribution of radioactivity in microsomal proteins was analyzed after separation by sodium dodecyl sulfate acrylamide gel electrophoresis. Most membrane proteins were labeled when intact microsomes were iodinated. No major membrane proteins were exclusively labeled in the presence of low detergent concentrations or after complete membrane disassembly. Therefore, it is unlikely that any major membrane proteins, other than glycoproteins, are located exclusively on the inner membrane face or completely embedded within the microsomal membrane. Microsomal proteins were also labeled by incubating rough microsomes with (^{3}H)-NaBH$_4$ after reaction with pyridoxal phosphate. Microsomal membranes were permeable to these small molecular weight reagents as shown by the fact that proteins in the vesicular cavity as well as membrane proteins were labeled with this system.

2558 FUNCTIONAL CHARACTERISTICS OF PEYER'S PATCH LYMPHOID CELLS. I. INDUCTION OF HUMORAL ANTIBODY AND CELL-MEDIATED ALLOGRAFT REACTIONS.

(E.) Kagnoff, M. F.; Campbell, S. (Dept. Med., Univ. California, San Diego). *J. Exp. Med.* 139(2):398-406, 1974.

Peyer's patches from normal mice (C57BL/6 or BALB/c) contain antigen-sensitive B and T cells, but lack the accessory adherent cell type(s) required both for the induction of humoral immune responses and for the induction of allograft reactions against cell surface alloantigens. Immune responsiveness can be restored to cultures of Peyer's patch cells by the addition of either adherent peritoneal exudate cells or 2-mercaptoethanol. Peyer's patch B cells can be specifically induced by antigen to synthesize humoral antibody. Peyer's patch T cells can cooperate in B-cell induction and can be induced to mediate an allograft reaction against an allogeneic stimulus. The allograft response is prevented when T cells are removed by antitheta serum produced in AKR/J mice by i.v. injections of C3HeB/FeJ thymus cells. In normal mice Peyer's patch lymphoid aggregates appear to be a storehouse of antigen-sensitive cells sequestered in such a way as to lack an accessory cell type or factor required for induction.

2559 MEMBRANE GLYCOPROTEINS OF THE RAT SMALL INTESTINE CHEMICAL COMPOSITION OF MEMBRANE GLYCOPROTEINS.

(E.) Kim, Y. S.; Perdomo, J. M. (Univ. California Sch. Med., San Francisco). *Biochim. Biophys. Acta* 32(1):111-124, 1974.

The glycoprotein and glycolipid content of brush border and submicrosomal membranes from the mucosa of the small intestine was investigated in male Sprague-Dawley rats. The microsomal preparations were treated to remove the "non-membranous" material before analysis. In all of the membranes nearly 80% of the carbohydrate was associated with the protein fraction, and 20% with the lipid fraction. The carbohydrate of the protein fraction consisted mainly of mannose, galactose, glucose, fucose, glucosamine, and galactosamine. With the exception of ribose, which was found only in the rough microsomal membrane, all the other sugars were present in similar quantities in all the membranes. The sugars in the lipid portion of the membranes consisted primarily of galactose and glucose. Amino sugars associated with the lipid fraction were found in the brush border membrane but were nearly absent in the internal membranes. Sialic acid was low in the protein and lipid fractions of all membranes. When sodium dodecylsulfate-gel electrophoresis of the membrane protein fractions was performed, many protein and glycoprotein bands were revealed. Each membrane had a different electrophoretic pattern both with respect to protein and to glycoprotein. The data obtained from this study suggest that internal membranes as well as the brush border membranes of the intestinal cells contain glycoproteins and glycolipids.

2560 HYPERPLASIA OF THE GASTRIC GLANDS AFTER SMALL BOWEL RESECTION IN THE RAT.

(E.) Winborn, W. B.; Seelig, Jr., L. L.; Nakayama, H.; Weser, E. (Univ. Texas Med. Sch., San Antonio). *Gastroenterology* 66(3):384-395, 1974.

One month and 7 months after proximal or distal small bowel resection, the number of epithelial cell of the gastric glands increased significantly in adult Sprague-Dawley rats. After 7 months, the increase in total gastric epithelial cells was significantly greater after proximal than after distal resection. There was no difference in cell counts 1 and 7 months after distal resection. At both 1 and 7 months after proximal or distal resection, there were no significant changes in the percentage of parietal cells. Light- and electron-microscopic studies indicate that the new parietal cells differentiate from mucous cells located in the isthmus of the gastric glands. This process of maturation of the parietal cells of the gastric glands is reminiscent of the differentiation observed in later embryo ic life and in transplanted gastric mucosa.

2561 ULTRASTRUCTURE OF HEPATOMA CELLS DETECTED IN PERITONEAL FLUID.

(E.) Woyke, S.; Domagala, W.; Olszowski, W. (Med. Acad., Szczecin, Poland). *Acta Cytol. (Baltimore)* 18(2):130-136, 1974.

The ultrastructural features of hepatoma cells detected in peritoneal effusion of a 24-yr-old woman were studied. Numerous mitochondria, large Golgi complexes, and dense bile-like material in the cytoplasm as well as the formation of bile canaliculi between adjacent hepatoma cells were characteristic ultrastructural features of hepatoma cells. Electron microscopic examination may be helpful in differentiating hepatoma cells from cells of other mali nant tumors encountered in effusions.

2562 DYNAMICS OF CYTOPLASMIC MEMBRANES IN GUIN PIG PANCREATIC ACINAR CELLS. I. SYNTHESI AND TURNOVER OF MEMBRANE PROTEINS.

(E.) Meldolesi J. (Dept. Pharmacol., Univ. Milan, Italy). *J. Cell Biol.* 61(1):1-13, 1974.

e rate of synthesis and the turnover of cytoplasmic
mbrane proteins were determined in the acinar cells
guinea pig pancreas with the aim of investigating
e mechanisms by which the intracellular transport
secretion products occurs. These cells are highly
ecialized toward protein secretion. *In vitro*
lse-chase experiments and *in vivo* double-labeling
periments, using radioactive L-leucine as the
acer, revealed that the turnover of secretory pro-
ins is much faster than that of all membranes in-
lved in their transport (rough and smooth microsome
d zymogen granule membranes). Sodium dodecyl
lfate-polyacrylamide disk gel electrophoresis of
mbrane proteins revealed that in each of these mem-
anes there is a marked heterogeneity of turnover;
nerally the high molecular weight polypeptides have
shorter half-life than the low molecular weight
lypeptides. These data indicate that the membranes
rticipating in the intracellular transport of se-
etory proteins are not synthesized concomitantly
th the latter. Rather, they are probably reutilized
several successive secretory cycles. It is con-
uded that it would be desirable to study other cell
stems in a carefully controlled manner, in order to
tablish the generality of the findings on pancreatic
inar cells.

63 KUPFFER CELL REACTIONS IN RAT LIVER
UNDER VARIOUS CONDITIONS AS OBSERVED IN
E ELECTRON MICROSCOPE. *(E.)* Wisse, E. (Lab.
ectron Microscopy, Univ. Leiden, Netherlands).
Ultrastruct. Res. 46(3):499-520, 1974.

pffer cell fine structure was studied in Wistar
ts after Thorotrast administration (3.0 ml/kg
v.), splenectomy, reticuloendothelial system sti-
lation with zymosan (a single i.v. injection of
mg or 5 daily injections of 4 mg/100 g), bile
ct ligation, and partial hepatectomy. In addi-
on, Kupffer cell morphology in Gunn rat livers
s examined. Ten min after Thorotrast injection,
merous thrombocytes were observed in the vicinity
endocytosing Kupffer cells. After 30 min large,
gregated masses of Thorotrast particles surround-
g chylomicrons were present on the Kupffer cell
rface. The chylomicrons phagocytosed at 3 hr,
en degranulation of Thorotrast-containing neutro-
ils was observed. After 2 days newly formed
nse bodies contained less Thorotrast. Worm-like
ructures and bristle-coated micropinocytotic
sicles played only a minor role in endocytosis.
anuloma formation was observed after Thorotrast
d zymosan injection. While other cell types took
small amounts of Thorotrast, zymosan particles
re taken up exclusively by Kupffer cells. No
anges in Kupffer cell morphology were found in
nn rats, and in Wistar rats there were only minor
anges after zymosan, splenectomy, bile duct liga-
on, and partial hepatectomy. Kupffer cell mitosis
curred after Thorotrast, zymosan, and partial
patectomy. This phenomenon contradicts the
pothesis that Kupffer cells derive from other
lls, including endothelial cells and monocytes.
nocytes and Kupffer cells differ with respect to
agocytic capacity, morphology, origin, and cyto-
emistry. The evidence favors the independent,
lf-proliferating activity of Kupffer cells.

2564 CHARACTERIZATION OF GASTRIC MUCOSAL MEMBRANES. VI. THE PRESENCE OF CHANNEL-FORMING SUBSTANCES. *(E.)* Sachs, G.; Spenney, J. G.; Saccomani, G.; Goodall, M. C. (Dept. Gastroenterol., Univ. Alabama, Birmingham). *Biochim. Biophys. Acta* 332(2):233-247, 1974.

Highly purified gastric membranes were extracted by ionic or nonionic detergents. Further fractionation was carried out on acrylamide gel electrophoresis. Some defined bands, incorporated into artificial bilayer membranes, produced discrete conductance changes characteristic of channel activity. A low molecular weight peak, purified through 2 cycles of electrophoresis, was characterized as an anion-selective, positively voltage dependent channel. A function for this channel in transport ATPase is postulated. The enzyme is visualized as an electrogenic pump, responsible for increased $OH^-(HCO_3^-)$ translocation. The anion channel is the parallel limb of the circuit, and being voltage dependent, would transport Cl^- in response to ATPase activity. The net result would be HCL secretion, and intracellular production of HCO_3^-, which is dissipated by a Cl^--HCO_3^- forced exchanged mechanism in the basal membrane.

2565 THE INFLUENCE OF ADRENORECEPTOR ACTIVITY ON CRYPT CELL PROLIFERATION IN THE RAT JEJUNUM. *(E.)* Tutton, P. J. M.; Helm, R. D. (Dept. Anat., Monash Univ., Clayton, Victoria, Australia). *Cell Tissue Kinet.* 7(2):125-136, 1974.

The influence of adrenergic stimulation, adrenergic blockade, and sympathectomy on crypt cell cycle time and mitotic time in male rat jejunum was studied. Alpha adrenergic stimulation by norepinephrine (1 μg/kg/min i.v.) shortened both cell cycle and mitotic times, whereas beta adrenergic stimulation by epinephrine (10 μg/kg/min i.v.) or isoproterenol (5 μg/kg/min i.v.) prolonged both cell cycle and mitotic times. Conversely, alpha adrenergic blockade by phentolamine (10 mg/kg i.p.) prolonged cell cycle time and beta adrenergic blockade by propranolol or practolol (each 10 mg/kg i.p.) shortened cell cycle time but not mitotic time. Both chemical and surgical sympathectomy inhibited crypt cell proliferation. Chemically sympathectomized animals manifested supersensitivity to exogenous norepinephrine. These results suggest the presence of an alpha adrenoreceptor within the intestine which is capable of stimulating cell division.

2566 RAPID RADIATION CELL DEATH AND CELL PROLIFERATION IN INTESTINAL EPITHELIUM AFTER 1000-RAD IRRADIATION. *(E.)* Tsubouchi, S.; Matsuzawa, T. (Aichi Cancer Ctr. Res. Inst., Nagoya, Japan). *Radiat. Res.* 57(3):451-458, 1974.

Rapid cell death of female lCR/JCL mouse intestinal crypt cells was investigated after 1000 rads of x-irradiation by counting pyknotic cells in tissue sections. The number of normal crypt cells decreased with the appearance of pyknotic cells after irradiation. Pyknotic cells appeared within 30 min and the number of pyknotic cells reached a maximum 4 hr after irradiation. From the disappearance rate of the cells the mean life span of pyknotic cells was estimated to be 2 hr or less. Pyknotic cells observed within 4 hr after irradiation were produced without cell division, and this interphase death by pyknosis occurred in all phases of cell cycle. The tendency for the cells to develop into pyknotic cells was high in G2 phase, intermediate in S phase, and low in G1 phase. The increase in mitotic index and the decrease in pyknotic cells from the 2nd to the 5th day after irradiation were inversely related. After the disappearance of pyknotic cells, rapid recovery of the cell population took place with logarithmic cell proliferation and shortening of the cell cycle. Recovery to the normal cell population level was attained within 5 days after irradiation.

2567 THE ENDOCRINE CELLS OF THE UPPER GUT MUCOSA IN DOGS WITH TRANSPLANTATION OF THE PYLORIC ANTRUM TO THE COLON. *(E.)* Lechago, J.; Bencosme, S. A. (Dept. Path., Queen's Univ., Kingston, Canada). *Z. Zellforsch.* 146(2):237-242, 1973.

An antrum transplantation to the colon was performed in 6 dogs of both sexes. Four of these animals developed gastric juice hypersecretion around the 12th postoperative day, while the 2 remaining dogs showed no changes in gastric juice output for as long as 3 months following surgery. The tissues from the transplanted antrums of the first 4 dogs showed a marked increase in enterochromaffin (EC) cells under light microscopy. Under light microscopy, the antral G or gastrin cells showed no obvious changes in number or appearance, although electron microscopic examination revealed slight ultrastructural changes in these cells. No ultrastructural changes were observed in the EC cells. There were no changes in the endocrine cells of the other areas of the upper gut. The mucosal tissues of the dogs which did not develop gastric hypersecretion were essentially indistinguishable from those of normal dogs. The EC cell hyperplasia may be related to the EC hyperplasia reported in the stomachs of some human patients with gastric hypersecretion and peptic ulcer. It is possible that some biogenic amines stored in the enterochromaffin cells of the stomach may have an acid secretogogue function.

2568 ULTRAHISTOCHEMICAL DETECTION OF BIOGENIC AMINES WITH REINECKE SALT IN GUINEA-PIG (Cavia cobaya) PANCREAS. *(Ger.)* Hahn von Dorsche, H.; Krause, R. (Anat. Inst., Ernst Moritz Arndt Univ., Greifswald, Germany). *Z. Mikrosc. Anat. Forsch.* 87(2):287-292, 1973.

The tail of the pancreas was removed from fasted adult male guinea pigs and placed in a buffered Reinecke salt solution (2:5 dilution) before treatment with osmium tetroxide. Examination of ultrathin sections under the electron microscope revealed the presence of vesicles in cells of the exocrine pancreas. These vesicles had an average diameter of 500 μm and all of them were bounded by a clearly defined membrane. Although some of these vesicles were empty, most contained material which was precipitated by Reinecke salt. Nuclei and a reduced number of mitochondria were present in cells containing these vesicles, but no evidence of archoplasm or the Golgi apparatus was detected. Other cells contained both these vesicles and zymogen granules, but the density of vesicles in these cells was lower than in cells which did not contain zymogen granules. Since Reinecke salt is a specific precipitator of amines, the vesicles must contain amines, but no information is available about their composition. Since vesicle-containing cells were scattered throughout the pancreas, it is suggested that amine-producing cells regulate the activity of parenchymal cells in the pancreas.

2569 NEUROHISTOCHEMICAL CHANGES IN THE WALL OF THE GALL-BLADDER INJURED BY THE LIGATION OF THE COMMON BILE DUCT. *(E.)* Ungvary, Gy.; Donath, T.; Naszaly, S. A. (Semmelweis Med. Univ., Budapest, Hungary). *Acta Morphol. Acad. Sci. Hung.* 21(3):281-293, 1973.

The common bile ducts of 56 guinea pigs were ligated near Vater's ampulla in an operation which left the nerves of the gall bladder uninjured. Although there was some damage to the enzyme systems (succinate dehydrogenase, nonspecific esterase, alkaline phosphatase) which characterize function in the normal gall bladder, the organ was still considered living in that these enzymes were functioning up to 1 week after the ligation. Within 24 to 48 hr, the "intact" neurons of the gall bladder had lost their catecholamine storage and/or uptake capacity. One day after the intervention, neurohistochemical means did not reveal functioning of the monoaminergic nerves, while after 2 days, functioning of the acetylcholinesterase-positive and zinc-iodine-osmium positive nerves was not demonstrable. While these phenomena do not necessarily indicate a functional loss in these nerves, they do suggest that significant changes occurred in the innervation of the gall bladder. Using silver impregnation techniques, the presence of nerve fibers in the gall bladders of the operated animals was demonstrated up to 1 week after the innervation.

2570 BIOCHEMICAL AND ULTRASTRUCTURAL STUDY OF GLYCOGEN IN JEJUNAL MUCOSA OF DIABETIC RATS (37790). *(E.)* Anderson, J. W.; Jones, A. L. (Veterans Administration Hosp., San Francisco, Calif.). *Proc. Soc. Exp. Biol. Med.* 145(1):268-272, 1974.

The glycogen concentration of jejunal mucosa was 423 μg/g or 0.04% of wet weight in normal rats. Diabetes was accompanied by a twofold increase in glycogen content whereas a 72-hr fast produced a 50% reduction of gut glycogen. In absorptive cells of diabetic rats β glycogen was observed throughout the cytoplasm but appeared particularly abundant in the terminal web region. The adaptive responses of gut glycogen levels to fasting and refeeding were similar to changes in the activities of gut glycolytic enzymes but glycogen and enzyme changes were less marked than those observed for the liver of the same animals.

'571 SCANNING AND TRANSMISSION ELECTRON MICROSCOPIC STUDIES OF JEJUNAL MICROVILLI OF THE AT, HAMSTER, AND DOG. *(E.)* Anderson, J. H.; Tayor, A. B. (Univ. of Illinois, Urbana). *J. Morphol.* 41(3):281-292, 1974.

canning and transmission electron microscopy were sed to investigate the surface area and number per nit area of microvilli from jejunal villus epithelal cells in the rat, hamster and dog. The calculated ean microvillus surface area was 0.419 μ^2, 0.573 μ^2, .751 μ^2 for the rat, hamster and dog respectively. he largest number of microvilli per square micron reeze dried villus surface was measured in the rat ith a mean value of 65. Hamster and dog freeze ried specimens had lower mean values of 54 and 34 icrovilli respectively. The total microvilli surace area in square micron per square micron villus urface was more closely related for the three pecies with values of 27.23 for the rat, 30.94 for he hamster and 25.53 for the dog. These data indiate an inverse relationship between the mean microillus surface area and population density in the pecies studied. However, the total microvilli urface area per unit villus surface is relatively imilar for the three species. The observed number f microvilli per unit villus surface varied depening upon the dehydration technique employed for reparation of scanning electron microscopic speciens. This variation probably reflects shrinkage rtifact and should be considered in soft tissue tudies involving the scanning electron microscope.

572 EPITHELIAL CELL SPECIALIZATION WITHIN HUMAN PEYER'S PATCHES: AN ULTRASTRUCTURAL TUDY OF INTESTINAL LYMPHOID FOLLICLES. *(E.)* Owen, . L.; Jones, A. L. (Veterans Administration Hosp., an Francisco, Calif.). *Gastroenterology* 66(2): 89-203, 1974.

he "M"(microfold) cell, a previously unrecognized uman intestinal mucosal cell type, is described rom studies by light microscopy, transmission elecron microscopy, and scanning electron microscopy. cells, characterized by luminal surface microfolds ather than microvilli, are located in areas of oncolumnar epithelium overlying lymphoid follicles n Peyer's patches. Attenuated M cell processes form latticework, allowing lymphoid cells to approach o within 0.3 μm of the intestinal lumen while mainaining the integrity of the intestinal epithelium. hese newly discovered epithelial cells contain muliple vesicles that suggest a transport function, ossibly for luminal antigenic material or for secreory immunoglobulin. Neither the transported comonents nor the direction in which transportation ccurs is known. However, at least two possibilities re worth investigation: 1) the lymphoid cells conained within M cell pockets could be responding here to antigenic material transported from the ntestinal lumen via the M cells, or 2) M cells may ouple IgA to secretory component and transport the mmunoglobulin complex into the lumen. Both suggestons are compatible with the observations.

573 SMALL INTESTINAL DAMAGE AND CHANGES IN CELL POPULATION PRODUCED BY ETHANOL INGESTION IN THE RAT. *(E.)* Baraona, E.; Pirola, R.; Lieber, C. S. (Veterans Administration Hosp., Bronx, N.Y.). *Gastroenterology* 66(2):226-234, 1974.

Acute intragastric administration of ethanol in concentrations similar to those of common alcoholic beverages produced hemorrhagic erosions of the small intestinal villi in CD rats from the Charles River Breeding Laboratories. The lesions were most obvious proximally and were concentration-dependent. Moderate lesions produced by a low ethanol concentration (5 g per 100 ml) were associated with decreased activities of jejunal lactase (-25%), and thymidine kinase (-18%), and a reduced O_2 consumption of jejunal slices (-25%). Chronic ingestion of ethanol in a liquid diet (5 g per 100 ml) did not produce hemorrhagic erosions. However, when compared with control rats which were pair-fed isocaloric carbohydrate for 3 to 4 weeks, alcohol-fed rats had intestinal villus changes, particularly in the jejunum, where the villi were shorter with fewer cells (-24%) and had decreased activities of jejunal lactase, sucrase, and alkaline phosphatase (-50%, -30%, -60%, respectively). By contrast, crypt changes were maximal in the ileum, with increases in cell counts (+28%), mitotic index (+59%), thymidine kinase activity (+69%), and a higher incorporation of ^{3}H-thymidine into deoxyribonucleic acid (+60%). The enzyme changes were not due to differences in carbohydrate intake since similar findings were obtained when ethanol was isocalorically substituted for dietary fat. Thus, in the rat, chronic ethanol ingestion results in a population of less mature intestinal mucosal cells with altered metabolic characteristics.

2574 ELECTRON MICROSCOPIC STUDY OF MAMMALIAN LIVER WITH PERIODIC ACID METHENAMINE SILVER STAIN: BASEMENT MEMBRANE STRUCTURE AND FIBROGENESIS IN SPACE OF DISSE. *(E.)* Kawanami, O. (Nippon Med. Sch. Tokyo, Japan). *Acta Pathol. Jap.* 23(4):717-738, 1973.

2575 HISTOCHEMICAL AND ELECTRON MICROSCOPIC OBSERVATIONS ON THE DEVELOPMENT, NEURAL CONTROL AND FUNCTION OF THE PANETH CELLS OF THE MOUSE. *(E.)* Ahonen, A. (Dept. Anat., Univ. Helsinki, Finland). *Acta Physiol. Scand.* (Suppl. 398):1-71, 1973.

2576 A METHOD FOR THE ISOLATION OF RAT SUBMANDIBULAR SALIVARY GLAND POLYSOMES ON LINEAR SUCROSE DENSITY GRADIENTS. *(E.)* Menaker, L.; Pong, R. S.; Miller, S. A.; Alvarez, C. (Dept. Nutr., Massachusetts Inst. Technol., Cambridge). *Anal. Biochem.* 57(2):325-335, 1974.

2577 CYTOCHEMICAL EVIDENCE FOR CATION FLUXES IN PAROTID ACINAR CELLS FOLLOWING STIMULATION BY ISOPROTERENOL. *(E.)* Simson, J. A. V.; Spicer, S. S. (Med. Univ. South Carolina, Charleston). *Anat. Rec.* 178(2):145-168, 1974.

2578 STIMULATION OF ACINAR CELL PROLIFERATION BY ISOPROTERENOL IN THE POSTNATAL RAT

SUBMANDIBULAR GLAND. *(E.)* Chang, W. W. L.; Barka, T. (Mt. Sinai Sch. Med., New York, N.Y.). *Anat. Rec.* 178(2):203-210, 1974.

2579 NORMAL PARAGANGLIA IN THE HUMAN GALLBLADDER. *(E.)* Kuo, T. T.; Anderson, C. B.; Rosai, J. (Washington Univ. Sch. Med., St. Louis, Mo.). *Arch. Pathol.* 97(1):46-47, 1974.

2580 CHARACTERISTICS OF THE REPRODUCTION OF HEPATOCYTES IN POSTNATAL DEVELOPMENT OF THE LIVER IN MICE. *(Rus.)* Brodskii, V. Ia.; Faktor, V. M.; Uryvaeva, I. V. (Inst. Biol., Moscow, USSR). *Arkh. Anat. Gistol. Embriol.* 65(7):7-15, 1973.

2581 MUCOUS MEMBRANE OF THE SMALL INTESTINE AFTER RESECTION OF THE STOMACH. *(Rus.)* Zufarov, K. A.; Tashkhodzhaev, P. I.; Rasulev, K. I. (Tashkent Med. Inst., USSR). *Arkh. Anat. Gistol. Embriol.* 65(8):18-24, 1973.

2582 COMPARISON BEWTEEN THE DEVELOPMENT OF NERVOUS APPARATUS AND PARENCHYMAL CELLS IN THE PANCREAS IN HUMAN EMBRYOGENESIS. *(Rus.)* Pervushin, V. Iu.; Stavrova, N. P. (Stavropol Med. Inst., USSR). *Arkh. Anat. Gistol. Embriol.* 65(8):68-74, 1973.

2583 AGE CHANGES IN THE HUMAN GASTRIC MUCOSA (HISTOMETRICAL STUDY). *(Rus.)* Zhukova, N. M.; Smolianski, B. L. (Military Med. Acad., Leningrad, USSR). *Arkh. Anat. Gistol. Embriol.* 65(9):92-95, 1973.

2584 ULTRASTRUCTURAL AND MORPHOMETRIC EVIDENCE OF DISTURBANCES IN OXIDATIVE METABOLISM INDUCED BY VITAMIN D DEFICIENCY. AN ULTRASTRUCTURAL-MORPHOMETRIC ANALYSIS OF RAT HEPATOCYTES. *(E.)* Riede, U. N.; Leibundgut, U.; Rohr, H. P. (Inst. Pathol., Univ. Freiburg, Germany). *Beitr. Pathol.* 150(4):378-388, 1973.

2585 THE ACTION OF α-AMANITIN IN VIVO ON THE SYNTHESIS AND MATURATION OF MOUSE LIVER RIBONUCLEIC ACIDS. *(E.)* Hadjiolov, A. A.; Dabeva, M. D.; Mackedonski, V. V. (Bulgarian Acad. Sci., Sofia). *Biochem. J.* 138(3):321-334, 1974.

2586 CHANGES IN FREE AND MEMBRANE-BOUND RIBOSOMES DURING THE DEVELOPMENT OF CHICK LIVER: A NEW CELL-FRACTIONATION APPROACH. *(E.)* O'Toole, K.; Pollak, J. K. (Dept. Histol., Univ. Sydney, Australia). *Biochem. J.* 138(3):359-371, 1974.

2587 RAPID SEPARATION OF PARTICULATE COMPONENTS AND SOLUBLE CYTOPLASM OF ISOLATED RAT-LIVER CELLS. *(E.)* Zuurendonk, P. F.; Tager, J. M. (Jansen Inst., Univ. Amsterdam, Netherlands). *Biochim. Biophys. Acta* 333(2):393-399, 1974.

2588 INFLUENCE OF A VIRUS INFECTION ON LACTIC DEHYDROGENASE ISOZYME COMPOSITION IN THE MURINE LIVER. *(Rus.)* Rudenko, V. I.; Usatenko, M. S.; Lebedeva, T. V. (Inst. Vaccines Sera, Leningrad, USSR). *Biull. Eksp. Biol. Med.* 77(2):41-43, 1974.

2589 CHARACTERISTICS OF THE 24-HOUR RHYTHM OF NUCLEO-CYTOPLASMIC RELATIONS AND OF THE VOLUMES OF HEPATOCYTE NUCLEI IN SOME MAMMALS IN CASE OF DIFFERENT PHYSICAL EXERCISES. *(Rus.)* Agenosova, A. P. (Tiumen Med. Inst., USSR). *Biull. Eksp. Biol. Med.* 77(2):80-83, 1974.

2590 THE ACTION OF SO-CALLED CELL STABILIZERS ON THE PRESERVATION OF PIG LIVER. *(Ger.)* Lie, T. S.; Ottersky, G. (Surg. Clin., Univ. Bonn, Germany). *Bruns Beitr. Klin. Chir.* 220(5):546-556, 1973.

2591 EFFECT OF n-HEXANE INHALATION OF THE MONOOXYGENASE SYSTEM IN MICE LIVER MICROSOMES. *(E.)* Kramer, A.; Staudinger, H.; Ullrich, V. (Biochem. Inst., Univ. Geissen, Germany). *Chem. Biol. Interact.* 8(1):11-18, 1974.

2592 STRUCTURE OF THE AFFERENT BRANCH OF PERIPHERAL VISCERO-VISCERAL REFLEX MECHANISMS IN THE TRANSVERSE COLON. *(Rus.)* Amvros'ev, A. P.; Rykhlikova, G. G. (Inst. Physiol., Acad. Sci. Belorussian SSR, USSR). *Dokl. Akad. Nauk Beloruss. SSR* 17(11):1061-1064, 1973.

2593 MORPHOLOGY OF ADRENERGIC NERVE STRUCTURES IN THE INTESTINAL WALL OF SOME MAMMALS. *(Rus.)* Amvros'ev, A. P. (Inst. Physiol., Acad. Sci. Belorussian SSR, USSR). *Dokl. Akad. Nauk Beloruss. SSR* 18(2):182-185, 1974.

2594 RIBOSOME PRECURSOR PARTICLES IN THE NUCLEOLUS OF RAT LIVER. EASILY EXTRACTABLE NUCLEOLAR 60-S RIBONUCLEOPROTEIN PARTICLES AND THEIR RELATION TO CYTOPLASMIC LARGE RIBOSOMAL SUBUNITS. *(E.)* Higashinakagawa, T.; Muramatsu, M. (Cancer Inst., Tokyo, Japan). *Eur. J. Biochem.* 42(1):245-258, 1974.

2595 ELECTRON MICROSCOPIC AND SEDIMENTATION STUDIES ON RAT-LIVER RIBOSOMAL SUBUNITS. *(E.)* Meyer, M.; Bont, W. S.; de Vries, M.; Nanninga, N. (Lab. Elec. Micros., Univ. Amsterdam, Netherlands). *Eur. J. Biochem.* 42(1):259-268, 1974.

2596 EARLY NUCLEAR CYTOCHEMICAL CHANGES IN REGENERATING MAMMLIAN LIVER. *(E.)* Alvarez M. R. (Dept. Biol., Univ. South Florida, Tampa). *Exp. Cell Res.* 83(2):225-230, 1974.

2597 PLASMA ADENOCORTICOSTEROID CHANGES DURING THYROXINE-INDUCED ACCELERATED MATURATION O

E NEONATAL RAT INTESTINE. *(E.)* Malinowska, K. E.; an, W. S.; Nathanielsz, P. W.; Hardy, R. N. hysiol. Lab., Cambridge, England). *Experientia* (1):61, 1974.

98 ANALYTICAL STUDY OF MICROSOMES AND ISOLATED SUBCELLULAR MEMBRANES FROM RAT LIVER. I. OCHEMICAL METHODS. *(E.)* Beaufay, H.; Amar-stesec, A.; Feytmans, E.; Thines-Sempoux, D.; bo, M.; Robbi, M.; Berthet, J. (Lab. Physiol. em., Univ. Louvain, Belgium). *J. Cell Biol.* (1):188-200, 1974.

99 ANALYTICAL STUDY OF MICROSOMES AND ISOLATED SUBCELLULAR MEMBRANES FROM RAT LIVER. . PREPARATION AND COMPOSITION OF THE MICROSOMAL ACTION. *(E.)* Amar-Costesec, A.; Beaufay, H.; bo, M.; Thines-Sempoux, D.; Feytmans, E.; Robbi, ; Berthet, J. (Lab. Physiol. Chem., Univ. Louvain, lgium). *J. Cell Biol.* 61(1):201-212, 1974.

00 ANALYTICAL STUDY OF MICROSOMES AND ISOLATED SUBCELLULAR MEMBRANES FROM RAT LIVER. I. SUBFRACTIONATION OF THE MICROSOMAL FRACTION ISOPYCNIC AND DIFFERENTIAL CENTRIFUGATION IN NSITY GRADIENTS. *(E.)* Beaufay, H.; Amar-stesec, A.; Thines-Sempoux, D.; Wibo, M.; Robbi, ; Berthet, J. (Lab. Physiol. Chem., Univ. Louvain, lgium). *J. Cell Biol.* 61(1):213-231, 1974.

01 ULTRASTRUCTURAL LOCALIZATION OF CYTOCHROME b_5 ON RAT LIVER MICROSOMES BY ANS OF HYBRID ANTIBODIES LABELED WITH FERRITIN. .) Remacle, J.; Fowler, S.; Beaufay, H.; Berthet, (Lab. Physiol. Chem., Univ. Louvain, Belgium). *Cell Biol.* 61(1):237-240, 1974.

2602 SUBFRACTIONATION OF GOLGI APPARATUS FROM RAT LIVER: METHOD AND MORPHOLOGY. *(E.)* Ovtracht, L.; Morre, D. J.; Cheetham, R. D.; Mollenhauer, H. H. (Lab. Cell Biol., Univ. Paris, France). *J. Microsc. (Paris)* 18(1):87-102, 1973.

2603 TWO TYPES OF NEURONES IN THE MYENTERIC PLEXUS OF DUODENUM IN THE GUINEA-PIG. *(E.)* Hirst, G. D. S.; Holman, M. E.; Spence, I. (Dept. Physiol., Monash Univ., Clayton, Australia). *J. Physiol. (Lond.)* 236(2):303-326, 1974.

2604 EFFECTS OF X-IRRADIATION ON CELL PROLIFERATION AND DNA SYNTHESIS INDUCED BY ADMINISTRATION OF ISOPROTERENOL IN SALIVARY GLANDS OF THE MOUSE. *(E.)* Furuno, I.; Iwasaki, T.; Matsudaira, H. (Natl. Inst. Biol. Sci., Anagawa, Japan). *Radiat. Res.* 57(3):431-441, 1974.

2605 ON THE FUNCTIONAL ASPECTS OF A PREPARATION OF AN INNER MEMBRANE FRACTION OF LIVER MITOCHONDRIA. III. *(E.)* Moore, C. L.; Strasberg, P. M. (Univ. Texas Med. Br., Galveston). *Tex. Rep. Biol. Med.* 31(3):385-402, 1973.

See also 2615, 2647, 2696, 2755, 2871, 2882, 2992, 2999, 3000.

ABSORPTION-EXCRETION-TRANSPORT

06 DRUG ABSORPTION IN RATS PRETREATED WITH ANTIBIOTICS. *(E.)* Walsh, C. T.; Levine, R. (Boston Univ. Med. Ctr., Mass.). *J. Pharmacol. p. Ther.* 188(2):277-286, 1974.

e effect of alterations of the bacterial population the small intestine produced by antibiotics on e absorption of pharmacologic agents was studied male Sprague-Dawley rats. After a treatment riod during which antibiotics were administered to ts in their drinking water, assays were performed measure the ileal bacterial population and the eal absorption of a series of drugs. A mean 10-day nsumption of 100 mg/kg/day of neomycin sulfate and mg/kg/day of potassium penicillin V produced a rked reduction in the counts of coliforms and proeus, enterococci, lactobacilli and anaerobic lactoacilli and streptococci. No significant differences tween control and pretreated animals were found, wever, in the absorption of tetracycline, diphenyldantoin, or benzomethamine. A regimen of lincomyn, averaging 61 mg/kg/day for 7 days, eliminated e lactobacilli population and produced overgrowths in coliforms in 2 out of 3 experiments. The ileal absorption of benzomethamine and chlorpromazine was not affected by this antibiotic pretreatment. Three regimens of tetracycline, averaging 110 mg/kg/day for 2 days, 209 mg/kg/day for 2 days, and 338 mg/kg/day for 5 days, all produced small reductions in anaerobic lactobacilli and streptococci. No differences were observed in the absorption of chlorpromazine as a result of tetracycline pretreatment. These antibiotic regimens that altered the enteric bacterial population apparently do not produce changes that are significant to the absorption process of the drugs studied.

2607 ABSORPTION OF FOLIC ACID BY EVERTED SEGMENTS OF RAT JEJUNUM. *(E.)* Blair, J. A.; Johnson, I. T.; Matty, A. J. (Dept. Chem., Univ. Aston, Birmingham, England). *J. Physiol. (Lond.)* 236(3):653-661, 1974.

The initial uptake rate of folic acid at various concentrations and incubation temperatures were studied in everted rings of Wistar rat intestine *in vitro*. Folic acid was accumulated linearly for periods of at least 30 min. The initial uptake rate reached a constant value as the concentration of folic acid in the incubation medium was increased above 5×10^{-6} M. Reducing the temperature of incubation from 37 to 27 C gave small Q_{10} values at either end of the concentration range. Transfer of folic acid into the serosal compartment of everted sacs was shown to undergo a rate reduction in the same concentration range. A mechanism for folic acid transport is suggested in which folic acid is converted to the neutral species at the mucosal surface in an acid microclimate.

2608 ACTIVE TRANSPORT OF ZINC AND IDENTIFICATION OF ZINC-BINDING PROTEIN IN RAT JEJUNAL MUCOSA.

(E.) Kowarski, S.; Blair-Stanek, C. S.; Schachter, D. (Coll. Physicians Surg., Columbia Univ., New York, N.Y.). *Am. J. Physiol.* 226(2):401-407, 1974.

Estimations of steady-state fluxes of Zn across everted segments of male Sherman albino rat jejunum *in vitro* demonstrate a net flux from the serosal surface to the mucosal surface in excess of that predicted for passive flux. This active transport against electrochemical potential gradients is abolished by 2,4-dinitrophenol (0.5 mM) plus iodoacetate (1.0 mM). The metabolic inhibitors markedly decrease both unidirectional fluxes in the steady state. Studies with everted gut sacs demonstrate that Zn flux from mucosa to serosa is greater in the rat jejunum and ileum as compared to the proximal duodenum, is dependent on ambient Na, O_2, and a metabolizable hexose, and is at least partially dependent on vitamin D. Transfer from serosa to mucosa is also dependent on ambient Na and is greater in the jejunum and ileum as compared to the proximal duodenum. A soluble Zn-binding protein has been identified in homogenates of rat jejunal mucosa. The partially purified protein has a molecular weight of approximately 10^5 and relatively little affinity for calcium.

2609 EFFECTS OF ETHANOL ON ACTIVE TRANSPORT IN THE DOG STOMACH.

(E.) Sernka, T. J.; Gilleland, C. W.; Shanbour, L. L. (Univ. Texas Med. Sch., Houston). *Am. J. Physiol.* 226(2):397-400, 1974.

Experiments were performed on an *in vivo* chambered dog stomach preparation to determine whether damage to the gastric mucosa with ethanol involves impaired active ion transport. When 20% ethanol in saline was placed in contact with the mucosa of the antrectomized resting stomach, the equivalent electrical resistance across the stomach wall increased. This observation is consistent with an effect on active ion transport, but not with an increase in conductance or ion permeability in the resting stomach. The much greater reduction in potential difference following topical administration of ethanol as compared with infusion of ethanol in the bloodstream also suggests an effect on ion transport at the mucosal surface. When ethanol contacted the antrectomized secreting gastric mucosa, the rate of acid secretion fell immediately, as measured by either the pH stat method or by a buffer instillation technique. Since the lumen was kept neutral throughout these experiments, it is concluded that ethanol acts initially on ion transport rather than ion permeability in the secreting stomach.

2610 EFFECT OF GLYCYLGLYCINE AND GLYCINE ON JEJUNAL ABSORPTION RATE OF L-HISTADINE IN MAN *IN VIVO*.

(E.) Cook, G. C. (Dept. Med. Univ. Zambia, Lusaka). *J. Physiol. (Lond.)* 237(1):187-194, 1974.

Using a double-lumen tube jejunal perfusion system *in vivo*, the effects of glycylglycine and glycine on the jejunal transfer rate of L-histidine were studied in a 30-cm jejunal segment, in 6 Zambian African men. Data on the effect of L-histidine on glycylgylcine transfer rate were also obtained. The solutions perfused in each subject contained L-histidine (100 mM/liter), L-histidine (100 mM/liter) and glycylglycine (50 mM/liter), glycylglycine (50 mM/liter), and L-histidine (100 mM/liter) and glycine (100 mM/liter). The presence of glycine in the perfusing fluid significantly impaired the absorption rate of L-histidine; glycylglycine had no significant effect. The presence of L-histidine in the perfusing fluid had no significant effect on the rate of glycylglycine absorption. When compared with results for glycine absorption rate in 12 Zambian African subjects in another study, the presence of L-histidine produced a significant impairment in the rate of glycine absorption. The results demonstrate a mutual inhibition between the rates of L-histidine and glycine absorption. The lack of a similar inhibition between L-histidine and glycylglycine is consistent with the concept of independent transfer mechanisms for amino acids and dipeptides in the human jejunum.

2611 EFFECT OF PROSTAGLANDIN E_1 UPON TRANSIT TIME AND NET AND UNIDIRECTIONAL MOVEMENTS OF WATER AND ELECTROLYTES IN THE HUMAN JEJUNUM.

(Fr.) Matuchansky, C.; Mary, J. Y.; Bernier, J. J. (St. Lazare Hosp., Paris, France). *Biol. Gastroenterol. (Paris)* 5(3):175-186, 1972.

A study was made of the effect of perfusing prostaglandin E_1 (0.9 μg/kg/min) through a 15 cm mixing segment and a 30 cm study segment of jejunum on transit time and net and unidirectional flow of water and electrolytes in 10 subjects (8 men and 2 women, aged 21-51 yr) with no gastroinestinal lesions or clinical abnormalities of transit time. An isotonic solution consisting of 100 mM NaCl, 4 μCi ^{22}Na, 100 μCi HTO, 10 g/liter polyethylene glycol 4000, and 100 mM mannitol was perfused at a rate of 10 ml/min. Each subject served as his own control. Prostaglandin E_1 significantly increased net secretion of water, sodium, chloride, potassium, and bicarbonate into the intestinal lumen. The effect of this prostaglandin on the net flux of water and sodium was due primarily to an increase in the unidirectional flow from blood to lumen and not to an increase in the transit time through the jejunum. The striking similarities between the effects of rostaglandin E_1 and cholera toxin on net and uni- rectional flow of fluid and electrolytes suggest lat both of these agents may act upon the same ecretory mechanism in the intestine.

612 INTESTINAL ABSORPTION OF INTACT PROTEINS IN NORMAL AND PROTEIN-DEFICIENT RATS. *(E.)*

rthington, B. S.; Boatman, E. S.; Kenny, G. E. Sch. Public Hlth. Commun. Med., Univ. Washington, eattle). *Am. J. Clin. Nutr.* 27(3):276-286, 1974.

ntestinal absorption of macromolecules was assessed control and protein-deficient Sprague-Dawley rats sing serological and morphological procedures. Ani- als weighing approximately 120 g were divided into groups and given a 0.5% or an 18% lactalbumin diet. monthly intervals following diet initiation, 8 an- als from each group were examined for their capacity absorb proteins from the small intestine. Five the 8 animals in each group received an oral dose bovine serum albumin (BSA, 0.8 mg/g) 4 hr prior blood collection. The remaining 3 animals were dministered horseradish peroxidase via ligated je- unal loops before loop excision and processing for lectron microscopy. Immunoelectro-osmophoresis of era revealed that, whereas both control and protein- eficient rats absorbed measurable quantities of BSA, rotein deficiency promoted an increase in transport. orphological evaluation of jejunal tissue from pro- ein deficient rats suggested initial increase in inocytotic activity with eventual deterioration of pical junctions and movement of protein molecules irectly between cells. In some protein-deficient ats BSA levels reached 500 μg. The physiological ignificance of these findings is unknown, but the ossibility exists that the animals may produce ntibodies to the circulating foreign proteins with esultant anaphylaxis or deposition of antigen- ntibody complexes in various body tissues.

613 THE INTESTINAL ABSORPTION OF DIETARY CHOLESTEROL BY HYPERCHOLESTEROLEMIC (TYPE II) ND NORMOCHOLESTEROLEMIC HUMANS. *(E.)*

Connor, W. .; Lin, D. S. (Univ. Iowa Coll. Med., Iowa City). . *Clin. Invest.* 53(4):1062-1070, 1974.

holesterol absorption was studied in 15 normocholes- erolemic and 6 hypercholesterolemic (type II) sub- ects fed background cholesterol-free formula diets ith 40% of calories as fat. Each test meal consis- ed of a breakfast into which was incorporated scram- led egg yolk containing 300-500 mg of cholesterol nd (4^{-14}C)cholesterol (3-22 μCi), either naturally ncorporated into the yolk cholesterol by previous sotope injection into the laying hen or added in eanut oil to the yolk of the test breakfast. In ome instances ($1\ \alpha$-^{3}H)cholesterol was the radioac- ive marker. The radioactivity of the fecal neutral terol fraction was determined in daily stool samples or the next 7 days to provide an estimate of unab- orbed dietary cholesterol. The amount of absorbed nd reexcreted labeled cholesterol was negligible. ost unabsorbed dietary cholesterol appeared in the tool on the second or third day after the meal, nd 95% or more was recovered in the stool by 6 days. lasma specific activity curves were usually maximal at 48 hr. Normal subjects absorbed 44.5% of the administered cholesterol. Hypercholesterolemics absorbed the same percentage of cholesterol as normals: 47.6%. Absorption was similar whether the radiolabeled cholesterol was added to egg yolk or naturally incorporated in it. Six normal subjects were fed a cholesterol-free formula for 4 weeks, and then different amounts of cholesterol (110-610 mg/day) were added for another 4 weeks. At the end of each period, single test meals containing either 110, 310, or 610 mg of cholesterol and (1α-^{3}H)cholesterol were administered. Cholesterol absorption was 42.3 and 45.4% for the 2 dietary periods, resp. The absolute cholesterol absorption was linearly related to the amount of cholesterol in the test meal, and absorption was not affected by background diets high or low in cholesterol content.

2614 A RE-EVALUATION OF THE IMPORTANCE OF PARTITION COEFFICIENTS IN THE GASTROINTESTINAL ABSORPTION OF NUTRIENTS. *(E.)*

Houston, J. B.; Upshall, D. G.; Bridges, J. W. (Biochem. Dept., Univ. Surrey, Guildford, England). *J. Pharmacol. Exp. Ther.* 189(1):244-254, 1974.

The gastrointestinal absorption of a homologous series of carbamates was investigated in male adult Porton rats using both *in vitro* and *in situ* techniques. *In vitro* data indicated that the intestinal absorption rate increased when the chain length of the carbamate was extended from methyl to *n*-butyl. A further increase in the chain length resulted in a fall in the absorption rate. The amount of carbamate tissue bound was also maximal for *n*-butyl carbamate. Mucosal loss was calculated from the amount of carbamate transferred plus that which was tissue-bound. At chain lengths up to *n*-butyl, the percentages transferred and tissue-bound were relatively constant at 85% and 15%, resp. At longer chain lengths, the percentage remaining in the tissue increased at the expense of the percentage transferred. No metabolism was detected during the passage through the gut *in vitro*. In *in situ* experiments, all carbamates exhibited monoexponential loss from the lumen. Absorption rates for *n*-butyl carbamate were not dependent upon variations in mucosal concentrations or competition from other carbamates (ethyl, *tert*-butyl and *n*-hexyl). Thus, the absorption process appeared to be passive. The concept of an optimal partition coefficient for intestinal absorption is discussed in terms of a 2-compartment model where a hydrophilic barrier and a lipoidal membrane control the rate of absorption. The gastric absorption rates of the same series of compounds did not share the same optimal partition coefficient.

2615 ABSORPTION OF LECITHIN AND LYSOLECITHIN BY THE GALLBLADDER. *(E.)*

Neiderhiser, D. H.; Morningstar, W. A.; Roth, H. P. (VA Hosp., Cleveland, Ohio). *J. Lab. Clin. Med.* 82(6):891-897, 1973.

The absorption of uniformly labeled ^{14}C-lecithin and ^{14}C-lysolecithin in guinea pig bile by the guinea pig gallbladder *in situ* was studied. Over a concentration range of 0.1 to 1.0 mM, 20 to 12% of instilled lecithin was absorbed. At a concentration of 0.1 mM, 50% of instilled lysolecithin was absorbed by the gallbladder. Recovery of radioactivity was greatest (33%) from the gallbladder wall and most of the radioactivity (70%) was present in lecithin rather than in lysolecithin. Histologic examination of gallbladder sections demonstrated no abnormality after instillation of 1.0 mM lecithin or 0.1 mM lysolecithin. Increasingly severe histologic changes were associated with instillation of 0.5 and 1.0 mM lysolecithin. These changes consisted of focal erosion and ulceration of the mucosa; edema of the lamina propria; diffuse and focal neutrophilic infiltration; an increased number of lymphocytes and plasma cells which were scattered, focal, perivascular, and follicular in distribution; varying degrees of hyperemia; and extravasation of erythrocytes.

2616 ABSORPTION OF TWO TRIPEPTIDES BY THE HUMAN SMALL INTESTINE: A STUDY USING A PERFUSION TECHNIQUE. *(E.)* Silk, D. B. A.; Perrett, D.; Webb, J. P. W.; Clark, M. L. (St. Bartholomew's Hosp., London, England). *Clin. Sci. Mol. Med.* 46(3):393-402, 1974.

A double-lumen perfusion technique was used in man to study intestinal absorption of 2 tripeptides, glycylglycyl-glycine and L-alanyl-glycyl-glycine. Intraluminal tripeptide hydrolysis was investigated by incubating both tripeptides *in vitro* with fresh uncentrifuged saline aspirates. Glycine was absorbed faster from a glycyl-glycyl-glycine solution (3.3 mmol/liter) than from an equivalent (10 mmol/liter) glycine solution, and both L-alanine and glycine were absorbed faster from 10 mmol/liter L-alanyl-glycylglycine than from the equivalent amino acid mixture. Free amino acids and dipeptides were aspirated during the tripeptide perfusions. L-Alanyl-glycyl-glycine was hydrolyzed faster than glycyl-glycyl-glycine *in vitro*, and results indicated that hydrolysis of the tripeptides occurred from the N-terminal end of the molecule. Intraluminal tripeptide hydrolysis was not sufficient to account for the concentrations of free amino acids and dipeptides liberated during the tripeptide perfusion experiments *in vivo*. It is suggested that the liberated amino acids and dipeptides either diffused back into the luminal contents after hydrolysis in the brush border had taken place, or effluxed from the mucosal cell after intracellular tripeptide hydrolysis.

2617 THE DEPENDENCE OF LIPID ABSORPTION *IN VIVO* IN SOLUBILIZED CONCENTRATION. *(E.)* Lee, K. Y.; Hurley, D. M.; Simmonds, W. J. (Dept. Physiol., Univ. Western Australia, Nedlands). *Biochim. Biophys. Acta* 337(2):214-224, 1974.

The variation of the *in vivo* absorption of lipid with the concentration solubilized in the lumen was studied. Two types of perfusates were prepared in which the total concentration of absorbable labeled lipid and of conjugated bile acid was the same. Absorption was tested in rats prepared in 2 ways: 1) unanesthetized with common bile duct and thoracic lymph duct cannulated in which lipid was continuously perfused by duodenal cannula; and 2) anesthetized with the small intestine cannulated proximally below the entrance of the common bile duct and distally in the lower third of the ileum. In the second preparation, the whole perfusate was injected at zero time and an even exposure to the entire mucosa ensured by to and fro displacement. In the first preparation, absorption of (^{14}C)oleic acid and glyceryl (^{3}H)monooleyl ether into the lymph was the same for both lipids and both perfusates. Lipid was almost completely absorbed before the perfusate reached the distal half of the small intestine. In the second preparation, disappearance of lipid from the lumen and uptake by the mucosa was less for the perfusate in which the concentration solubilized was lower. Oleic acid was absorbed more rapidly than monoether, relative to the concentrations solubilized. These findings agreed with results for everted sacs *in vitro*. It is suggested that in the first preparation, decreased absorption per unit area can be compensated by utilization of more of the total absorptive area. In the second preparation and in everted sacs, no such compensation is possible and variation in absorption rate with solubilized concentration can be readily demonstrated.

2618 STUDIES OF GLYCEROL TRANSPORT ACROSS THE RABBIT BRUSH BORDER. *(E.)* Rubin, A. W.; Deren, J. J. (Dept. Med., Univ. Pennsylvania, Philadelphia). *Gastroenterology* 66(3):378-383, 1974.

The unidirectional movement of glycerol across New Zealand rabbit brush border was studied *in vitro*. The permeability coefficient for glycerol across the ileal brush border decreased from 3.41 x 10^{-4} cm/sec at 0.05 mM to 0.65 x 10^{-4} cm/sec at 5 mM, and remained constant at this level from 5-50 mM. Glucose (10 mM) and phlorizin (0.5 mM) did not inhibit glycerol movement. N-ethylmaleimide (10 mM) inhibited glycerol transport from a 0.05 mM solution by more than 55%, but did not affect glycerol uptake from a 50 mM solution. Glycerol movement across the ileal brush border, measured from a 0.05 mM solution, was twice as great as the movement across proximal intestine. In contrast, glycerol movement across proximal and distal intestine was similar when measured from a 50 mM solution. It is concluded that glycerol movement occurs both by diffusion *via* the aqueous regions of the membrane and by a saturable carrier-mediated mechanism.

2619 COLONIC ABSORPTION OF VITAMIN K-3. *(E.)* Hollander, D.; Truscott, T. C. (Albany Med. Coll., N.Y.). *J. Lab. Clin. Med.* 83(4):648-656, 1974.

Colonic transport of vitamin K-3 was investigated *in vitro* using everted, perfused, colonic segments from Sprague-Dawley rats. Stepwise increase in mucosal vitamin K-3 concentration up to 900 μM resulted in linear increase in the transport rate. Basal absorption rate of the vitamin under oxygen atmosphere at a mucosal concentration of 300 μM was 10.99 nmol/min/100 mg of dry tissue. Transport rate under nitrogen atmosphere, or with 10^{-4} M 2,4-dinitrophenol, or with 3 x 10^{-3} M sodium azide did not decrease. Using the same experimental preparation, a fatty acid,

ctanoate, was transported well across the colon,
ut no transport of a water-soluble alcohol, eryth-
itol, took place. Vitamin transport ceased in the
bsence of a concentration gradient across the colo-
ic mucosa. This study strongly indicates that rat
olonic absorption of vitamin K-3 takes place *via* a
assive transport process; a similar passive trans-
ort mechanism has been noted for small bowel ab-
orption of vitamin K-3 in the rat.

620 EFFECT OF ESSENTIAL FATTY ACID DEFICIENCY ON AMINO ACID UPTAKE BY THE SMALL INTESTINE F RATS. *(E.)* Johns, J. T.; Bergen, W. G. (Dept. nim. Husb., Michigan State Univ., East Lansing). . *Nutr.* 104(3):300-305, 1974.

he role of essential fatty acid (EFA) deficiency on ntestinal amino acid transport was studied in prague-Dawley rats. Extracellular space (measured y inulin) became constant after a 40-min *in vitro* ncubation of intestinal rings from rats fed the ontrol diet but continued to increase for rats fed he EFA-deficient diet for 12-14 week. The K_m and /$_{max}$ values of lysine and methionine transport were ot affected by diet. However, the amino acid dis- ribution ratios (capacity of cells to retain con- entrated amino acids) were lower for intestinal rings from EFA-deficient rats. Glucose (10 or 50 mM) inhibited methionine transport in both control and EFA-deficient intestinal rings. The data suggest that EFA deficiency induces membrane alterations in the intestinal mucosa that lower the ability of mucosal cells to retain amino acids.

2621 STUDIES ON THE INCREASED ABSORPTION OF OUBAIN, PHENOLSULPHONPHTHALEIN AND PRALIDOXIME CAUSED BY SODIUM LAURYL SULPHATE FROM SINGLE-LOOP PREPARATIONS IN THE RAT. *(E.)* Briseid, G.; Briseid, K.; Bergersen, B. (Inst. Pharm., Univ. Oslo, Norway). *Naunyn Schmiedebergs Arch. Pharmacol.* 282(1):45-57, 1974.

In concentrations above the critical micelle concentration (effective range about 2-22 mM), sodium lauryl sulfate caused graded increases in the absorption of ouabain, phenolsulfonphthalein, and pralidoxime by jejunal loops in anesthetized albino rats. Replacement of sodium chloride in the medium by sucrose or of Tyrode solution by a sodium phosphate buffer significantly reduced surfactant-induced increases in phenolsulfonphthalein and pralidoxime absorption. Replacement of sodium chloride by mannitol had little effect on surfactant-induced increases in ouabain absorption. No change occurred in the extent of absorption in the absence of surfactant. Increased absorption caused by sodium lauryl sulfate must be ascribed to a direct action on the intestinal membrane. These results indicate that surfactant-induced increases in phenolsulfonphthalein and pralidoxime absorption are Na-dependent.

2622 ON THE MECHANISM OF ISOOSMOTIC TRANSPORT OF FLUID ACROSS THE SMALL INTESTINE. THE EFFECT OF THE STAVERMAN REFLECTION COEFFICIENT OF THE SOLUTE USED TO INCREASE THE OSMOLALITY OF THE MUCOSAL SOLUTION ON THE COMPOSITION OF THE ABSORBATE. *(E.)* Beck, I. T.; Dinda, P. K. (Hotel Dieu., Kingston, Canada). *Can. J. Physiol. Pharmacol.* 52(1):96-104, 1974.

The mechanism by which fluid transport across the small intestine becomes isoosmotic with the mucosal solution was investigated. The osmolaity of the mucosal solution of a unilaterial preparation (the serosal side was not bathed) was increased with water-soluble nonelectrolyte solutes having different Staverman reflection coefficients (σ), and the composition of the undiluted absorbate was studied. The solutes (hyperosmotic agents) used were formamide, urea, erythritol, and mannitol. As shown by a method based on potential difference depression, the σ's of these solutes in the hamster small intestine were 0.26, 0.85, 0.93, and 1.00, resp. Data on transport across the unilateral preparation showed that when the intestine was incubated in an isotonic solution (Krebs-Ringer bicarbonate solution containing 10 mM glucose, 292 mosmol/kg), the absorbate was essentially isotonic although its composition differed significantly from that of the mucosal solution. When the osmolality of the mucosal solution was increased to 342, 393, or 442 mosmol/kg with any of the hyperosmotic agents, the absorbate was always isoosmotic with the mucosal solution. With formamide (low σ) as the hyperosomotic agent, the concentration of electrolytes and glucose in the absorbate was the same as that in control preparation (incubated in the isotonic mucosal solution), and the transported fluid became isoosmotic with the mucosal solution exclusively due to the presence of formamide in the absorbate. When the osmolality of the mucosal solution was increased with urea, erthrytol, or mannitol, the concentration of these hyperosmotic agents in the absorbate decreased linearly with the increase in their σ; the absorbate became isoosmotic with the mucosal solution due to a linear increase in the concentration of electrolytes and glucose. In addition, the transport of fluid, solutes, and fluid/solute decreased linearly with the increase in the hyperosomtoic agents. Further calculations indicated that the increase in the concentration of electrolytes and glucose with increase in σ of the hyperosmotic agents was due almost exclusively to a linear decrease in fluid/solute transport.

2623 1α,24-DIHYDROXYCHOLECALCIFEROL RECEPTORS IN INTESTINE. II. TEMPERATURE-DEPENDENT TRANSFER OF THE HORMONE TO CHROMATIN VIA A SPECIFIC CYTOSOL RECEPTOR. *(E.)* Brumbaugh, P. F.; Haussler, M. R. (Coll. Med., Univ. Arizona, Tucson). *J. Biol. Chem.* 249(4):1258-1262, 1974.

Specific binding of 1α,25-dihydroxycholecalciferol in the cytosol and purified chromatin fractions of chick small intestinal mucosa was studied to investigate the mechanism by which this hormone arrives at its chromatin binding site. The cytosol fraction of the mucosa contains a macromolecule with a high affinity for 1α,25-dihydroxycholecalciferol and has a limited number of binding sites which are saturated at low hormone concentrations (approximately 10^{-8} M). The association of the sterol with the cytoplasmic component is thermolabile, and is destroyed by treatment with pronase, but not by nucleases, and the receptor component is therefore presumed to be a protein. The protein-sterol complex was isolated and characterized by sucrose gradient centrifugation and sediments at 3 to 3.5 S in the presence of 9.15 M KCl. The interaction of 1α,25-dihydroxy[^{3}H] cholecalciferol with the cytosol protein is reversed by unlabeled 1α,25-dihydroxycholecalciferol > 25-hydroxycholecalciferol > 1 -hydroxycholecalciferol > cholecalciferol = estradiol-17β. The subcellular localization of 1α,25-dihydroxycholecalciferol is temperature-dependent. The hormone remains bound to the cytosol fraction at 0° in whole intestines *in vitro*, and a dramatic movement of 1α,25-dihydroxycholecalciferol to the nuclear chromatin occurs at 37°. The temperature dependence of the hormone localization is also evident in intestinal mucosa homogenates and reconstituted cytosol-chromatin systems. This observation suggests that the cell membrane and nuclear membrane are not involved in the temperature-dependent process. It is postulated that the specific cytosol receptor for 1α,25-dihydroxycholecalciferol functions to transport the hormone to its ultimate site of action in the nuclear chromatin. This receptor system is similar to those described for other steroid hormones, and lesions in the system may explain vitamin D-resistant diseases.

2624 1α,25-DIHYDROXYCHOLECALCIFEROL RECEPTORS IN INTESTINE. I. ASSOCIATION OF 1α,25-DIHYDROXYCHOLECALCIFEROL WITH INTESTINAL MUCOSA CHROMATIN.

(E.) Brumbaugh, P. F.; Haussler, M. R. (Coll. Med., Univ. Arizona, Tucson). *J. Biol. Chem.* 249(4):1251-1257, 1974.

Vitamin D$_3$ (cholecalciferol) is known to be metabolized to 1α,25-dihydroxycholecalciferol, and this sterol is thought to be the active form of the vitamin. Oral administration of increasing amounts of radioactive vitamin D$_3$ to vitamin D-deficient chicks resulted in a saturable binding of 1α,25-dihydroxycholecalciferol to the intestinal chromatin that paralleled saturation of the calcium absorption response. Saturation of the chromatin binding sites and maximum stimulation of calcium absorption occurred after a 20 I.U. dose of cholecalciferol. The appearance of 1α,25-dihydroxycholecalciferol in the chromatin precedes the calcium absorption response by 2 to 8 hr after a physiologic dose of 1α,25-dihydroxycholecalciferol (390 pmoles). This sterol also specifically associates with the chromatin fraction after incubation with intestinal mucosa homogenates *in vitro*. The chromatin fraction contains a finite number of binding sites for 1α,25-dihydroxycholecalciferol, and closely related sterols such as 25-hydroxycholecalciferol in equal concentration do not bind to this fraction; however, displacement of the hormone from the receptor can be achieved by concentrations of cholecalciferol = dihydrotachysterol$_2$ >> 1α-hydroxycholecalciferol > 25-hydroxycholecalciferol >> 1α,25-dihydroxycholecalciferol. Pretreatment of rachitic chicks with unlabeled vitamin D$_3$ or 1α,25-dihydroxycholecalciferol reduced the subsequent binding of radioactive 1α,25-dihydroxycholecalciferol to the intestinal chromatin *in vitro*. It is concluded that localization of the apparent hormonal form of vitamin D$_3$, 1α,25-dihydroxycholecalciferol, in the nucleus of the target tissue is probably involved in the physiologic response of calcium transport.

2625 DEMONSTRATION OF ELECTROGENIC Na$^+$-DEPENDENT D-GLUCOSE TRANSPORT IN INTESTINAL BRUSH BORDER MEMBRANES.

(E.) Murer, H.; Hopfer, U. (Dept. Biochem., Swiss Fed. Inst. Technol., Zurich). *Proc. Natl. Acad. Sci. USA* 71(2):484-488, 1974.

Na$^+$-coupled D-glucose transport was studied in isolated membrane vesicles from intestinal brush borders of Sprague-Dawley rats. Concentration gradients of SCN$^-$, K$^+$, and H$^+$ were established between the intravesicular solution and the incubation medium and their influence on D-glucose uptake from the medium was measured. A gradient (medium > vesicle) of NaSCN, but not of KSCN, produced a transient overshoot of D-glucose uptake above the equilibrium level. Similarly, an increase of the membrane conductance with valinomycin (K$^+$-conductance) or with uncoupling agents of oxidative phosphorylation (H$^+$-conductance) induced an overshooting D-glucose uptake, provided a (vesicle > medium) K$^+$-gradient or a H$^+$-gradient, resp., was present in each case. The transient overshoot is evidence that D-glucose was taken up against its concentration gradient (up to 10-fold). The gradients of SCN$^-$, K$^+$ (in the presence of valinomycin), and H$^+$ (in the presence of uncouplers) are thought to contribute to this active D-glucose transport by changing the electrical potential across the vesicle membrane and thus making the inside more negative (with respect to the medium). These experiments, therefore, provide evidence that the Na$^+$-coupled D-glucose translocation across the brush border membrane is an electrogenic process, i.e., the positive charge associated with Na$^+$ is not compensated by the co-movement of an anion or the counter-movement of a cation *via* the glucose carrier. The results imply that an electrical potential across the brush border membrane may play an important role in determining the transport of D-glucose by intact cells.

2626 MONOGLYCERIDE MODIFICATION OF JEJUNAL ABSORPTION OF FATTY ACID IN THE RAT.

(E.) Marubbio, Jr., A. T.; Morris, Jr., J. A.; Clark, S. B.; Holt, P. R. (St. Luke's Hosp. Ctr., New York, N. Y.). *J. Lipid Res.* 15(2):165-172, 1974.

The effect of increasing the intracellular pool of mono-olein on the subsequent uptake and esterification of oleic acid was investigated using *in vitro* rat jejunal slice techniques. The mucosal pool of monoglyceride was expanded by preincubation of jejunal slices in a bile salt medium containing 2-monoelexl glycerol at a temperature close to 1 C, which inhibited esterification. Subsequent incubation in micellar [^{14}C]oleic acid was performed either at 37 C or in the cold. Monoglyceride preincubation increased [^{14}C]oleic acid uptake by about 60% without increasing incorporation of fatty acid into triglyceride. This was not due to inhibition of esterifying capacity nor to changes in oleic acid binding to a mucosal fatty acid-binding protein. It is suggested that under these experimental conditions monoglyceride may modify intracellular pools of fatty acid. However, when monoglyceride and fatty acid were preincubated together, mucosal esterification rates during subsequent incubation at 37 C more than doubled. The data suggest that although the unstirred water layer around mucosal cells may be a barrier to the movement of fatty acid it is not rate limiting for overall fatty acid flux from the medium and into the cell.

2627 EFFECTS OF 25-HYDROXYVITAMIN D_3 ON RAT DUODENUM, JEJUNUM, AND ILEUM: CORRELATION OF CALCIUM ACTIVE TRANSPORT WITH TISSUE LEVELS OF VITAMIN D_3 METABOLITES. *(E.)* Walling, M. W.; Favus, M. J.; Kimberg, D. V. (Michael Reese Hosp. Med. Ctr., Chicago, Ill.). *J. Biol. Chem.* 249(4):1156-1161, 1974.

Jejunum and ileum from vitamin D-deficient Sherman rats actively secreted calcium when studied *in vitro*, while duodenum from these animals actively absorbed calcium. Acute repletion with a single physiologic dose of 25-hydroxyvitamin D_3 (25-OH D_3) (15 IU) increased calcium absorption in duodenum and ileum but had no effect on jejunum. Studies of the distribution of 25-OH D_3 and its metabolites in these tissues demonstrated that levels of 1,25-$(OH)_2$ D_3 per cell were highest in duodenum, much lower in ileum, and lower still in jejunum. The increased calcium absorption in duodenum and ileum was proportional to the levels of 1,25-$(OH)_2D_3$ in these tissues. This was not the case for jejunum however, because while 1,25-$(OH)_2$ D_3 was present, calcium transport rates were unchanged. Another finding was a much higher percentage of water-soluble metabolites of 25-OH D_3 in jejunum and ileum than in duodenum. This observation may relate to an enterohepatic circulation of these compounds. These experiments suggest that previous reports of decreased calcium absorptive responses by lower small bowel (relative to proximal duodenum) to treatment with vitamin D, or prolonged dietary calcium deprivation, can be explained by the differential cellular localization of 1,25-$(OH)_2$ D_3 (duodenum > ileum > jejunum).

2628 NUTRITIONAL SIGNIFICANCE OF THE EFFECT OF A HIGH-SODIUM DIET ON INTESTINAL GLYCINE ABSORPTION IN THE RAT. *(Fr.)* Peres, G. E.; Cier, J. F.; Peres, G. (Fac. Med., Lyon, France). *C. R. Soc. Biol. (Paris)* 167(8/9):1146-1149, 1973.

2629 INTESTINAL WATER ABSORPTION IN YOUNG AND OLD, GERMFREE AND CONVENTIONAL RATS. *(E.)* Gordon, H. A. (Coll. Med., Univ. Kentucky, Lexington). *Experientia* 30(2):214-215, 1974.

2630 EFFECT OF THE SIZE OF HAY PARTICLES ON DIGESTION IN THE SHEEP. *(E.)* Alwash, A. H.; Thomas, P. C. (Sch. Biol. Sci., Univ. Leeds, England). *J. Sci. Food Agric.* 25(2):139-147, 1974.

2631 THE ABSORPTION OF SUBSTITUTED DERIVATIVES OF GITOXIN AND HELVETICOSOL IN THE RAT INTESTINE. *(Ger.)* Mentz, P.; Forster, W. (Inst. Pharm. Toxicol., Martin Luther Univ., Halle-Wittenberg, Germany). *Arch. Int. Pharmacodyn. Ther.* 206 (2):311-316, 1973.

2632 HYDROLYSIS AND ABSORPTION OF CARBOHYDRATES IN ELDERLY SUBJECTS. *(Rus.)* Valenkevich, L. N. (Leningrad Pediatr. Med. Inst., USSR). *Vopr. Pitan.* (6):29-31, 1973.

2633 THE EFFECTS OF LARGE OSMOLALITY VARIATIONS ON THE GASTRIC MUCOSAL ION PERMEABILITY. *(E.)* Frenning, B. (Biomed. Ctr., Uppsala Univ., Sweden). *Acta Physiol. Scand.* 90(1):1-13, 1974.

2634 MEASUREMENT OF THE TOTAL DAILY DIETARY IRON ABSORPTION BY THE EXTRINSIC TAG MODEL. *(E.)* Layrisse, M.; Martinez Torres, C.; Gonzalez, M. (Inst. Sci. Res., Caracas, Venezuela). *Am. J. Clin. Nutr.* 27(2):152-162, 1974.

2635 FOLIC ACID ABNORMALITIES IN IRON DEFICIENCY: THE MECHANISM OF DECREASED SERUM FOLATE LEVELS IN RATS. *(E.)* Toskes, P. P.; Smith, G. W.; Bensinger, T. A.; Giannella, R. A.; Conrad, M. E. (Walter Reed Army Inst., Washington, D.C.). *Am. J. Clin. Nutr.* 27:355-361, 1974.

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2641 NICOTINIC ACID ACTIVE TRANSPORT BY IN VITRO BULLFROG SMALL INTESTINE. *(E.)* Fox, K. R.; Hogben, C. A. M. (Dept. Physiol., Univ. Iowa, Iowa City). *Biochim. Biophys. Acta* 332(3):336-340, 1974.

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2652 EFFECT OF PROTEIN SYNTHESIS ON N-ACETYLGLUCOSAMINE TRANSPORT IN THE INTESTINAL MUCOSA OF THE RAT. *(Fr.)* Frot-Coutaz, J.; Got, R. (Lab. Membrane Biochem., Villeurbanne, France). *Experientia* 30(2):144-146, 1974.

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INTESTINAL CALCIUM ABSORPTION IN PATIENTS
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arrison, J. E.; Wilson, D. R. (Dept. Med., Univ.
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levizaki, C. C.: Ikkos, D. G. (Evangelismos Hosp.,
thens, Greece). *Metabolism* 23(4):311-321, 1974.

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(Ger.) Pahlke, G.; Friedrich, R. (Dept.
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INTESTINAL ABSORPTION OF THE BASIC DRUGS
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AT. *(E.)* Ochsenfahrt, H.; Winne, D. (Inst. Pharma-
ol., Univ. Tubingen, Germany). *Naunyn Schmiede-
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Na^+-K^+-ATPase ACTIVITY IN THE HYPER-
ROPHYING RAT CECUM. *(E.)* Loeschke, K.; Uhlich,
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ers Arch.* 346(3):233-249, 1974.

666 EFFECT OF ALTERATIONS OF ZINC STATUS ON
THE ZINC CONTENT OF THE GASTROINTESTINAL TRACT OF CHICKS. *(E.)* Kasarskis, E. J.; Hoekstra, W. G. (Dept. Biochem., Univ. Wisconsin, Madison). *Proc. Soc. Exp. Biol. Med.* 145(2):508-512, 1974.

2667 INTESTINAL ABSORPTION OF IRON IN THE IRRADIATED RABBIT. *(Fr.)* Tache, J.; Mehran, A. R.; Tache, Y. (Inst. Med. Exp. Surg., Univ. Montreal, Canada). *Rev. Can. Biol.* 32(3): 157-167, 1973.

2668 CALCIUM ABSORPTION AND CALCIUM-BINDING PROTEIN SYNTHESIS: SOLANUM MALACOXYLON REVERSES STRONTIUM INHIBITION. *(E.)* Wasserman, R. H. (New York State Vet. Coll., Ithaca). *Science* 183(4129):1092-1094, 1974.

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See also 2871, 2885, 3041, 3042, 3077, 3177.

MOTILITY

671 GASTRIC EMPTYING IN HEALTHY SUBJECTS AND
IN PATIENTS WITH VARIOUS MALABSORPTIVE
TATES. *(E.)* Moberg, S.; Carlberger, G. (St. Erik's
osp., Stockholm, Sweden). *Scand. J. Gastroenterol.*
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astric emptying of a 300-ml test liquid meal con-
aining fat, carbohydrate, and protein was measured
n 7 healthy controls and in 8 patients with steator-
hea, 4 of whom had distal resections of the small
ntestine, 2 chronic pancreatitis, and 2 celiac di-
ease. The gastric emptying curve for the healthy
ubjects could be divided into a short, rapid phase
nd a much slower second phase during which a con-
tant amount of the test meal was emptied per min.
n patients with severe steatorrhea, the gastric
mptying of the fat-containing meal used here closely
esembled that of healthy subjects emptying an inert
est meal. Thus no inhibition of the rapid gastric
mptying rate was noted in these patients. The 1
atient with marked pancreatic insufficiency had no
easureable amount of trypsin in the intestinal contents. Thus it may be deduced that the lipase activity was insufficient. This theory is supported by the finding of extremely small amounts of free fatty acids in the upper small intestine of this patient. Therefore the failure of this patient to retard gastric emptying might have been caused by inadequate digestion of fat. The 2 patients with extensive small bowel resections had high fecal fat content and a fast gastric emptying rate. It is felt that such patients have a defective micelle formation of the fat, which is essential in order to elicit the retarding impulses. It is suggested that these 2 patients did not reach the critical micellar concentration. Of the patients with gluten-enteropathy, it was suggested that lack of bile and disturbed micelle formation may have caused the defective inhibition of the gastric emptying rate. Regardless of the cause, the patients with the largest disturbances of fat absorption showed the largest deviation from the normal gastric emptying pattern. These findings agree with the assumption that gastric emptying of a test meal of the type used here is regulated by fat absorption.

2672 REFLEX ADRENERGIC INHIBITION OF GASTRIC MOTILITY ELICITED FROM THE GASTRIC ANTRUM.

(E.) Abrahamsson, H. (Dept. Physiol., Univ. Goteborg, Sweden). *Acta Physiol. Scand.* 90(1):14-24, 1974.

The reflex effects of distension and contraction of the gastric antrum on corpus-fundus motility were studied in 30 anesthetized cats. Besides a vagally mediated reflex corpus-fundus relaxation, antral distension elicited prompt reflex inhibition of corpus-fundus contractions; this also occurred after vagotomy. In vagotomized animals this inhibitory reflex also persisted after cervical spinal cord transection, but was abolished by spinal anesthesia or by guanethidine (3-5 mg/kg). Stepwise increases in antral distension revealed that the reflex corpus-fundus inhibition appeared at distending pressures of 5-10 cm H_2O, then increased in a graded fashion, and could be maintained for at least 10 min if a steady distension was applied. Isometric antral contractions were also effective in eliciting reflex corpus-fundus inhibition. It is concluded that activation of slowly adapting "tension receptors" in the antral gastric wall inhibits gastric (corpus-fundus) motility via a spinal reflex mechanism, mediated by splanchnic adrenergic fibers that suppress intramural excitatory cholinergic neurons. This gastrogastric adrenergic inhibitory reflex seems to be activated concomitantly with a vago-vagal gastro-gastric relaxation reflex. These two suppressive reflex mechanisms may play an important role in regulation of gastric motor function.

2673 CHOLINESTERASE HISTOCHEMISTRY OF THE INNERVATION OF THE SMOOTH MUSCLE SPHINCTERS AROUND THE TERMINAL INTRAMURAL PART OF THE DUCTUS CHOLEDOCHUS IN THE CAT AND THE DOG.

(E.) Kyosola, K. (Dept. Anat., Univ. Helsinki, Finland). *Acta Physiol. Scand.* 90(1):278-280, 1974.

The microarchitecture of the choledocho-duodenal junction, together with the distribution of acetylcholinesterase and nonspecific cholinesterases, was studied in 25 adult cats and 5 adult dogs. In the lamina propria of the duodenum, including the core of the villi, an irregular network of varicose nerve fibers was observed. The muscularis muscosae of the duodenum was innervated by a dense nerve plexus of richly beaded, delicate nerve fibers; in the dog this nerve plexus also contained large nerve fascicles or nerve trunks and a few small ganglia. Acetylcholinesterase-positive ganglia were abundant in the submucosa of the duodenum. In the cat a nerve plexus with small ganglia was observed in the basal 2/3 of the lamina glandularis mucosa of the common bile duct. This layer was devoid of acetylcholinesterase activity in the dog, like the epithelium in both species. In both species, the smooth muscle and the ganglia in the submucosa of the duodenum or within the sphincters, as well as the nerves in these layers and in the lamina propria of the duodenum, were strongly positive for nonspecific cholinesterases. The lamina glandularis muscosae of the canine common bile duct was devoid of such activity, whereas several types of nonspecific cholinesterase-positive structures were seen in the cat. The epithelium of the common bile duct was devoid of nonspecific cholinesterase activity in both species. The results are indicative of active complex motor functions of the choledocho-duodenal junction, in contrast to only slow gross contractions of the intestine.

2674 A COMPARISON BETWEEN PRIMARY ESOPHAGEAL PERISTALSIS FOLLOWING WET AND DRY SWALLOWS.

(E.) Dodds, W. J.; Hogan, W. J.; Reid, D. P.; Stewart, E. T.; Arndorfer, R. C. (Med. Coll. Wisconsin, Milwaukee). *J. Appl. Physiol.* 35(6):851-857, 1973.

Esophageal peristalsis associated with wet and dry swallows was studied in 18 young adult subjects, using both infusion (1.6 ml/min) and noninfusion manometric techniques. For both recording techniques, wet swallows elicited a higher incidence of normal peristaltic sequences than did dry swallows. Quantitative differences in peristaltic variables existed between peristalsis associated with wet versus dry swallows. In the distal half of the esophagus, a wet swallow was associated with a significantly greater amplitude and duration of the peristaltic pressure complex, a slower wave speed, and a longer duration of lower sphincter relaxation than was a dry swallow. These findings may be accounted for by differences in bolus volume, esophageal stretch, or in the physical work necessary to move a bolus mass into the stomach against the abdominal-thoracic pressure gradient. It is concluded that differences in the incidence and quantitative features of peristalsis associated with wet versus dry swallows should be considered when designing protocols for esophageal manometry or when comparing results from different studies.

2675 THE ACTION OF SECRETIN, TRYPSIN AND HISTAMINE ON THE MOTILITY OF CANINE INTESTINAL VILLI.

(E.) Nemeth, E. P.; Thasz, M.; Folly, G.; Papp, M. (Semmelweis Univ. Med. Sch., Budapest, Hungary). *Am. J. Gastroenterol.* 60(6):607-615, 1973.

Gradually increasing doses of secretin, trypsin, and histamine were injected into the artery of the 1st jejunal loop in dogs to determine the number of villous contractions and to study early effects on the capillaries and the jejunal mucous membrane. Secretin significantly increased and trypsin reduced the number of intestinal villous contractions. Less than 1 μg of histamine increased the number of contractions, and 1 μg caused a decrease. Larger doses of secretin (8-16 U), trypsin (250 μg), and histamine (5 μg) elicited spastic contractions of the intestinal villi. In the villi and the intestinal mucous membrane these agents produced ischemia, followed by dilatation of the capillaries, stasis, and pericapillary bleeding. Both in its manifestation and its extent, this early vascular reaction greatly resembled impairment of microcirculation in the mucous membrane occurring in experimental pancreatitis. It is suggested that secretin, trypsin, and histamine may inhibit the motor function of the stomach and jejunum in acute pancreatitis.

2676 RESPIRATORY MECHANICS OF VOMITING IN DECEREBRATE CATS. *(E.)* McCarthy, L. E.; Borison, H. L. (Dartmouth Med. Sch., Hanover, N.H.). *Am. J. Physiol.* 226(3):738-743, 1974.

2677 THE FATIGUEABILITY OF THE CARDIA-CLOSURE-MECHANISM (EXPERIMENTAL INVESTIGATIONS IN THE DOG). *(Ger.)* Petracic, B.; Petracic, L.; Wenzel, R.; Bahr, R.; Krause, F.; Weisswange, V. (Surg. Clin., Univ. Tubingen, Germany). *Bruns Beitr. Klin. Chir.* 220(3):320-322, 1973.

2678 A NOVEL APPROACH TO THE QUESTIONS OF ALLOSTERIC PROPERTIES OR A 'RECEPTOR RESERVE' OF DRUG BINDING SITES OF INTESTINAL SMOOTH MUSCLE CELLS. *(E.)* Kuhnen-Clausen, D. (Inst. Aerobiol., Fraunhofer Soc., Grafschaft/Sauerland, Germany). *FEBS Lett.* 39(1):61-66, 1974.

2679 EFFECTS OF THYMOL ON THE ELECTRICAL AND MECHANICAL PROPERTIES OF THE GUINEA-PIG TAENIA COLI. *(E.)* Ito, Y.; Kuriyama, H. (Dept. Physiol., Kyushu Univ., Fukuoka, Japan). *J. Physiol. (Lond.)* 236(1):143-157, 1974.

2680 ACTIONS OF GLUCOSE AND POTASSIUM CHLORIDE ON OSMORECEPTORS SLOWING GASTRIC EMPTYING. *(E.)* Barker, G. R.; Cochrane, G. McL.; Corbett, G. A.; Hunt, J. N.; Roberts, S. K. (Guy's Hosp., London, England). *J. Physiol. (Lond.)* 237(1):183-186, 1974.

2681 THE INHIBITORY ACTION OF CAFFEINE ON THE SMOOTH MUSCLES OF MOUSE MYOMETRIUM AND GUINEA PIG ILEUM. *(E.)* Osa, T. (Fac. Dent., Kyushu Univ., Fukuoka, Japan). *Jap. J. Physiol.* 23(2):199-216, 1973.

2682 RELATION OF INTESTINAL MOTILITY TO VENOUS OUTFLOW AND SATURATION OF BLOOD O_2 THROUGH MESENTERIC BLOOD VESSELS. *(E.)* Semba, T.; Fujii, K.; Mizonishi, T. (Univ. Hiroshima, Sch. Med., Japan). *Jap. J. Physiol.* 23(6):541-557, 1973.

2683 EFFERENT ACTIVITY IN RENAL AND INTESTINAL NERVES DURING CIRCULATORY REFLEXES. *(E.)* Irisawa, H.; Ninomiya, I.; Wooley, G. (Sch. Med., Univ. Hiroshima, Japan). *Jap. J. Physiol.* 23(6):657-666, 1973.

2684 ANTICHOLINERGICS AND ANTACIDS. *(E.)* Polish, E. (Grad. Hosp., Univ. Pennsylvania, Philadelphia). *Semin. Drug Treat.* 3(4):331-338, 1974.

2685 ELECTRICAL ACTIVITY OF THE SMALL INTESTINE IN MAN. *(It.)* Lanfranchi, G. A. (1st Inst. Special Med. Pathol., Univ. Bologna, Italy). *Minerva Med.* 65(11):620-623, 1974.

2686 PRESENCE OF ANGIOTENSIN RECEPTORS IN THE STOMACH OF RATS. *(It.)* Cessi, C.; Bettini, V. (Inst. Human Physiol., Univ. Padua, Italy). *Boll. Soc. Ital. Biol. Sper.* 49(9):433-437, 1973.

2687 ADRENERGIC RECEPTORS OF THE GASTROINTESTINAL TRACT. *(Pol.)* Szalaj, W. (Acad. Med., Bialystok, Poland). *Pol. Tyg. Lek.* 28(37):1432-1435, 1973.

See also 2644, 2734, 3042, 3090.

SECRETION AND METABOLISM

2688 MOLECULAR REGULATION OF DIGESTION: SHORT TERM AND BOND SPECIFIC. *(E.)* Rothman, S. S. (Sch. Med., Univ. California, San Francisco). *Am. J. Physiol.* 226(1):77-83, 1974.

The effect of lysine on the secretion of trypsinogen, which splits lysine-containing peptide bonds, was tested as a function of its route of administration (intestinal, i.v., or *in vitro*). Duodenal perfusion of 1 x 10^{-4} M lysine moderately increased overall protein secretion but did not alter the secretion of trypsinogen relative to chymotrypsinogen. Lysine (1 x 10^{-3} M) increased the proportion of trypsinogen in secretion, but overall protein secretion was no longer enhanced. I.v. lysine also increased trypsinogen secretion relative to chymotrypsinogen but did not affect overall protein output. Unlike its *in vivo* administration, lysine added directly to medium bathing whole pancreas *in vitro* acted as a negative feedback influence favoring the secretion of chymotrypsinogen over trypsinogen. Selective secretion was observed within 40 min and appears to be the result of changes in the transport of enzymes rather than their synthesis. The data suggest that short-term (within meal), bond-specific regulation of digestion may occur for the trypsinogen-lysine pair by both positive and negative feedback mechanisms acting at the acinar cell and at other sites.

2689 SYMPATHETIC VASODILATATION, KALLIKREIN RELEASE AND ADRENERGIC RECEPTORS IN THE CAT SUBMANDIBULAR SALIVARY GLAND. *(E.)* Gautvik, K.; Kriz, M.; Lund-Larsen, K.; Waaler, B. A. (Inst. Physiol., Univ. Oslo, Norway). *Acta Physiol. Scand.* 90(2):438-444, 1974.

2690 THE METABOLIC FUEL REGULATORY SYSTEM: IMPLICATIONS FOR PROTEIN-SPARING THERAPIES DURING CALORIC DEPRIVATION AND DISEASE. *(E.)* Flatt, J. P.; Blackburn, G. L. (Dept. Nutr., Massachusetts

Inst. Technol., Cambridge). *Am. J. Clin. Nutr.* 27(2):175-187, 1974.

2691 CHEMICAL ANTRONEUROLYSIS. *(E.)* Schapiro, H.; Britt, L. G.; Crowson, W. N.; Sharpton, B. (Univ. Tennessee Med. Units, Memphis). *Am. J. Surg.* 127(1):83-89, 1974.

2692 PROTEIN COMPOSITION OF HUMAN SUBMANDIBULAR SECRETIONS. *(E.)* Mayo, J. W.; Carlson, D. M. (Sch. Med., Case Western Reserve Univ., Cleveland, Ohio). *Arch. Biochem. Biophys.* 161(1): 134-145, 1974.

2693 THE ROLE OF DIETARY TRIGLYCERIDES IN CHOLESTEROL METABOLISM. *(E.)* Fraser, R.; (Dept. Pathol., Univ. Sydney, Australia). *Atherosclerosis* 19(2):327-336, 1974.

2694 ADENOSINE 3',5'-MONOPHOSPHATE-DEPENDENT PROTEIN KINASE AND AMYLASE SECRETION FROM RAT PAROTID GLAND. *(E.)* Kanamori, T.; Hayakawa, T.; Nagatsu, T. (Sch. Dent., Nagoya, Japan). *Biochem. Biophys. Res. Commun.* 57(2):394-398, 1974.

2695 STUDIES ON THE METABOLISM OF RIBOSOMAL RNA AND PROTEIN OF FREE AND MEMBRANE-BOUND POLYRIBOSOMES OF RAT LIVER. *(E.)* Murty, C. N.; Sidransky, H. (Univ. South Florida, Coll. Med., Tampa). *Biochim. Biophys. Acta* 335(2): 226-235, 1974.

2696 EXOCRINE SECRETION IN THE PAROTID GLAND: A STEREOLOGICAL ANALYSIS AT THE ELECTRON MICROSCOPIC LEVEL OF THE ZYMOGEN GRANULE CONTENT BEFORE AND AFTER ISOPRENALINE-INDUCED DEGRANULATION. *(E.)* Cope, G. H.; Williams, M. A. (Dept. Human Biol., Univ. Sheffield, England). *J. Anat.* 116(2):269-284, 1973.

2697 PAROTID SECRETION AND FEEDING IN SHEEP FOLLOWING INTRAVENTRICULAR INJECTIONS OF 1-NOREPINEPHRINE, dl-ISOPROTERENOL, PENTOBARBITAL, AND CARBACHOL. *(E.)* Baile, C. A.; Martin, F. H. (Smith Kline Anim. Health Prod., West Chester, Pa.). *J. Dairy Sci.* 57(3):303-313, 1974.

2698 EVIDENCE FOR THE OSMOTIC FLOW ACROSS DOG SUBMAXILLARY GLAND EPITHELIA AS A CAUSE OF SALIVARY SECRETION. *(E.)* Imai, Y.; Nishikawa, H.; Yoshizaki, K.; Watari, H. (Kyoto Pref. Univ. Med., Japan). *Jap. J. Physiol.* 23(6):635-644, 1973.

2699 SOLUBILITY AND PROTEOLYTIC DEGRADATION OF PANETH CELL SECRETIONS. *(E.)* Geyer, G. (Inst. Anat., Univ. Jena, Germany). *Z. Mikrosk. Anat. Forsch.* 87(5/6):782-788, 1973.

See also 2577, 2578, 2604.

SECRETION AND METABOLISM

Stomach

2700 AN EXPERIMENTAL STUDY OF THE ANTRAL GASTRIN MECHANISM. *(E.)* Friesen, S. R.; Crosby, I.; Boggan, M. D.; Fiallos, E.; Lees, J. M.; Cudnik, D. B.; Underwood, III, J.; Peckler, M. S.; Craig, C. C.; Friesen, R. H.; Bolinger, R. E.; McGuigan, J. E. (Univ. Kansas Sch. Med., Kansas City). *Surgery* 75(4):517-527, 1974.

Over a 4-yr period experiments were carried out in 120 dogs in which the gastric antral mucosa was subjected, on a chronic basis, to 9 different environmental conditions in 3 general categories of influence: antral "stimulation," antral "inhibition," and "neutral" (Neither antral stimulation nor inhibition). To substantiate the endocrine function of the antrum, the influence of the antral mucosal environment on antral gastrin release was measured directly by repeated serum gastrin concentrations and indirectly by gastric acid concentrations and the incidence of ulceration. The antrum of the dog was responsive to chronic experimental stimulation by distention and by alkaline secretions of the colon, duodenum, and gallbladder, as evidenced by significant elevations of serum gastrin concentrations and by an increase in the incidence of acid-peptic ulceration. When the antrum is in juxtaposition to acid-secreting gastric mucosa, no significant increases in serum gastrin content occur; furthermore, if the antral mucosa is chronically exposed to histamine-provoked acid hypersecretion, significant reductions in serum gastrin content are observed, suggesting inhibition of antral gastrin release. The antral mucosa is dynamically responsive to experimental changes in its environment without evidence of fatigue within the observed experimental period of 6 months.

2701 INCREASED RESPONSIVENESS OF GASTRIC MUCOSA TO GASTRIN STIMULATION IN THE ECK FISTULA RAT. *(E.)* Kutz, K.; Herz, R.; Halter, F.; Leuenberger, J.; Bircher, J. (Dept. Clin. Pharmacol., Univ. Berne, Switzerland). *Gastroenterology* 66(1):73-78, 1974.

To further analyze the gastric hypersection occurring after a portacaval shunt, gastric acid output was measured in 20 anesthetized male Sprague-Dawley rats randomly divided into an experimental group which was subjected to a portacaval shunt, and an unoperated group of similar age. Fourteen days after end to side portacaval anastomosis, intravenous injections of 8, 16 and 32 ng of human gastrin I resulted in significantly higher total and peak acid outputs than in appropriate control rats. The time course of gastric secretion revealed no evidence for a shunt-induced alteration in the rate of gastrin degradation. Therefore, the data suggest that, in shunted rats, the parietal cell mass is more sensitive to gastrin stimulation than in control rats.

2702 STIMULATION BY 2-DEOXY-D-GLUCOSE AND INHIBITION BY INSULIN OF GASTRIC SECRETION IN FISTULA CHICKENS.

(E.) Burhol, P. G. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 8(8): 761-764, 1973.

The effect of i.v. injection of 2-deoxy-D-glucose (100, 200, and 400 mg/kg) and insulin (2.5, 5, and 10 U/kg) on basal gastric secretion was studied in 10 fistula Plymouth Rock chickens. A dose of 200 mg/kg 2-deoxy-D-glucose was required before gastric water, H^+, and pepsin secretion increased significantly after nearly 60 min. In dogs, gastric secretion increases 20 min after a 50 mg/kg dose. The gastric secretion in the chicken is subject to vagal stimulation. Insulin showed a dose-dependent and significant inhibition of the gastric secretion of water and H^+, but not of pepsin secretion. Insulin inhibits the gastric secretion by a direct action on the gastric transport of water and H^+. It is concluded that fistula chickens can be used as a model to study the inhibitory effect of insulin unopposed by any central stimulatory effect.

2703 MUCOSAL CYCLIC AMP AND SECRETION IN THE DOG STOMACH.

(E.) Mao, C. C.; Jacobson, E. D.; Shanbour, L. L. (Univ. Texas Med. Sch., Houston). *Am. J. Physiol.* 225(4):893-896, 1973.

The following hypothesis was evaluated, that an elevation of gastric mucosal cyclic AMP is essential for initiation of acid secretion. The preparation was a flap of fundic dog stomach *in situ*. Intra-arterial and intravenous infusion of histamine and pentagastrin initiated brisk secretion of acid from the stomach, but neither agent changed mucosal cyclic AMP content. The potent phosphodiesterase inhibitor, papaverine, significantly increased canine gastric mucosal cyclic AMP concentration when infused intra-arterially but did not evoke any secretion of acid. The findings suggest that cyclic AMP is not the mediator of acid secretion in the dog stomach.

2704 CALCIUM-SECRETAGOGUE INTERACTION IN THE STIMULATION OF GASTRIC ACID SECRETION.

(E.) Kasbekar, D. K. (Georgetown Univ. Sch. Med. Dent., Washington, D. C.). *Proc. Soc. Exp. Biol. Med.* 145(1):234-239, 1974.

Gastric epithelia of R. catesbeiana were depleted of Ca^{2+} in the continued presence of secretagogues by removing this cation from the bathing media and repeated washouts with or without EDTA until acid secretion was reduced to zero. Under these conditions, both the transmucosal potential difference and resistance declined. Incubation of these epithelia in presence of 1 m*M* Ca^{2+} in the luminal bathing medium resulted in a partial reversal of potential difference and resistance with initiation of some secretion, in contrast to near complete reversal obtained following restoration of Ca^{2+} to the serosal bathing medium. Dibutyryl cyclic-AMP or theophylline enhance acid secretion in these circumstances without complete reversal of potential difference and resistance. These observations suggest that cellular Ca^{2+} may play a direct role in the production of H^+ *per se* by mediating the secretagogue effect in raising intracellular cyclic-AMP levels, in addition to its established role in the maintenance of integrity of junctional complexes which are essential for the luminal segregation of H^+ in the secretory process.

2705 EFFECT OF RED CHILLI POWDER ON DNA CONTENT OF GASTRIC ASPIRATES.

(E.) Desai, H. G.; Venugopalan, K.; Antia, F. P. (Nair Charitable Hosp., Bombay, India). *Gut* 14(12):974-976, 1973.

The DNA content in gastric aspirate was measured in the basal state and after infusion of 1.6 and 0.8 g/hr of red chilli powder into the stomach through a double-lumen tube. During one hour, 400 ml of normal saline was slowly infused and the gastric aspirate was collected. The measured quantity of red chilli powder was added to 500 ml of normal saline and was slowly infused through the tube for the next hour and the gastric aspirate was collected. The DNA content was measured with diphenylamine reagent. The subjects included controls, patients with duodenal ulcer in remission and patients with chronic gastritis. There was a highly significant increase in the DNA in gastric aspirate after intragastric infusion of red chilli powder. The results suggest a rapid and marked exfoliation of gastric surface epithelial cells in human subjects given red chilli powder.

2706 DOES BURIMAMIDE INHIBIT GASTRIC ACID SECRETION BY A RELEASE OF CATECHOLAMINES?

(E.) Albinus, M.; Sewing, K.-Fr. (Pharmacol. Inst., Univ. Tubingen, Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 279(4):417-420, 1973.

The effect of burimamide (4 mg/kg, i.v.) on histamine-stimulated gastric acid secretion and gastric mucosal blood flow (GMBF) was estimated in anesthetized gastric fistula cats. Both histamine-stimulated gastric acid secretion and GMBF were reduced by about 65% by burimamide; GMBF was reduced for a longer period of time than was gastric acid secretion. The inhibitory effect of burimamide on gastric acid secretion was reduced by phenoxybenzamine (4 mg/kg, i.v.) administered 1 hr prior to the infusion of histamine. The burimamide injection also elevated systolic and diastolic blood pressure and increased cardiac frequency. The blood pressure response was antagonized by the α-receptor blocking agent phentolamine and the cardiac response was antagonized by the β-receptor blocking agent propranolol. The blood pressure response to burimamide was also markedly reduced by acute adrenalectomy. The effect of burimamide on gastric acid secretion was not antagonized by phentolamine, propranolol, or adrenalectomy. The effects of burimamide on the stomach can be at least partially explained in terms of a release of catecholamines.

2707 STRUCTURE-ACTIVITY RELATIONSHIPS OF GASTRIN: CONTRIBUTION OF THE CARBOXYL GROUPS OF 9- AND 10-GLUTAMIC ACID TO BIOLOGICAL ACTIVITY.

(Ger.) Wissmann, H.; Schleyerbach, R.; Schoelkens, B.; Geiger, R. (Farbwerke Hoechst AG, Frankfurt/Main, Germany). *Hoppe Seylers Z. Physiol.* 354(12):1591-1598, 1973.

Four short-chain analogues of human gastrin I were synthesized to determine whether the presence of γ-carboxyl groups in positions 9 and 10 of gastrin have any effect on the biological activity of this hormone. Biological activity was studied by measuring gastric acid secretion during perfusion of the stomachs of fasted anesthetized male Wistar rats *in situ* and by measuring the effects of these peptides on a variety of cardiovascular parameters. Acylation of the C-terminal tetrapeptide of gastrin with radicals which are resistant to enzymatic hydrolysis caused a significant enhancement in the stimulation of gastric acid secretion. A further increase in biological activity was obtained by N-terminal elongation of the peptide chain up to positions 6-10 which consist of 5 glutamic acid esters and by exchanging methionine for leucine in the 15 position. This increase also occurs if a single γ-carboxyl group is introduced, in the form of a 4-carboxybutyryl group. Introduction of a second carboxyl group causes only a slight additional increase in biological activity. These short-chain gastrin analogues had a less pronounced effect on the cardiovascular system than pentagastrin.

2708 CHANGES IN GASTRIC ACID AND PEPSIN SECRETION IN RATS WITH SUBACUTE ULCERS OF THE STOMACH AND DUODENUM. NEW EXPERIMENTAL MODEL.

(Sp.) Monfort Albelda, R.; Sanchez de la Cuesta y Alarcon, F.; Alemany Ontiveros, J. R.; Aznar Lopez, J. (Fac. Med., Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(7):771-778, 1973.

Subacute ulcers were induced in fasted male Sprague-Dawley rats by subserosal injection of 0.03-0.04 ml of 10% acetic acid into the stomach or the first part of the duodenum. Then physiological saline was injected i.p. to destroy excess acetic acid and to prevent peritoneal adhesions. Rats were fed a normal diet after 4-7 days, and total acidity, pH, and pepsin activity were measured by a modification of Lai's technique in which distilled water was instilled i.v. (0.38 ml/hr). Effluent perfusion fluid was strongly acid in rats with ulcers, particularly in those with ulcers of the duodenum. Although there was a highly significant difference in the pH between rats with gastric and duodenal ulcers, the difference in total acidity was not significant. This suggests that the decrease in pH is due primarily to an increase in HCl secretion in rats with duodenal ulcers and to an increase in the secretion of organic acids in rats with gastric ulcers. The proteolytic activity of the gastric effluent was significantly higher in rats with gastric ulcers than in those with duodenal ulcers. This suggests that in gastric ulcer there is a larger supply of substrate in the form of unchanged pepsinogen; this is determined as pepsin. This animal model is recommended for the study of the effects of drugs on peptic ulcers since it is a good approximation of peptic ulcers in man.

2709 CALCITONIN INHIBITION OF GASTRIC SECRETION IN RAT.

(E.) Orimo, H.; Oyama, T.; Ito, H. (Metropolitan Geriatr. Hosp., Tokyo, Japan). *Endocrinol. Japon.* 20(5):439-446, 1973.

In a series of 3 experiments, male Wistar rats were left untreated, subjected to pyloric ligation, injected s.c. with porcine thyro-calcitonin (1 MRC U) before and/or during pyloric ligation, or subjected to surgical removal of the parathyroid gland prior to pyloric ligation. Thyrocalcitonin markedly inhibited the accumulation of gastric acid and the development of acute gastric ulcer in the pylorus ligated rats; this effect was dose dependent. The gastric output in the parathyroidectomized animals was not significantly different from that in the intact animals, indicating that hypocalcemia does not necessarily cause the inhibition of gastric acid secretion in the rat. Since a lower dose of thyrocalcitonin (0.0625 MUC U) caused a significant inhibition of gastric acid accumulation 6 hr after s.c. injection (at which time its hypocalcemic effect had disappeared), the inhibitory effect of thyrocalcitonin on the secretion of gastric acid may be due to a direct effect of the thyrocalcitonin and may not be due to the hypocalcemia caused by this hormone. Although prior treatment with thyrocalcitonin prevented the development of ulcer in rats subjected to 9 hr of pyloric ligation, this effect was markedly reduced when the ligation is extended to 12 hr. It is therefore possible that acute gastric ulcer in the pylorus ligated rat is produced by the increased secretion of gastric acid. Thyrocalcitonin may be useful in preventing the development of peptic ulcer.

2710 IMMUNOSYMPATHECTOMY AND GASTRIC SECRETION.

(E.) Rivilis, J. (Jewish Gen. Hosp., Montreal, Canada). *Arch. Surg.* 107(4):618-621, 1973.

Immunosympathectomized (IS) Wistar rats did not differ from normal controls in terms of weight, volume of gastric juice secreted in 2 hr/100 g of rat, or peptic activity. However, the celiac ganglia of the IS rats were only 70-80% the size of those of the controls, and the cell density of the IS ganglia was much lower than in the controls, the cells in the IS ganglia having been partially replaced by connective tissue. The nuclei of the remaining cells in the IS animals were grossly abnormal. Shallow ulcers and hyperemia in the glandular portion of the stomach appeared in 4 of the 5 IS rats after pyloric ligation for 2 hr and the 5th IS rat had marked hyperemia. There were no macroscopic or microscopic changes in the stomachs of the controls. The data indicate that the sympathetic nervous system plays little or no part in the production of acid or pepsin. However, it appears to play an important part in the protective mechanism of the gastric mucosa.

2711 PENTAGASTRIN-STIMULATED PEPSIN SECRETION IN MAN AND DOGS. *(E.)* Magee, D. F. (Creighton Univ., Sch. Med., Omaha, Neb.). *Ann. Surg.* 179(3):300-303, 1974.

Pentagastrin (6.0 μg/kg s.c.) significantly increases the secretion of pepsin in asymptomatic unoperated controls and in patients following recent or old vagotomy. In recent vagotomy patients, both stimulated and unstimulated acid and pepsin were significantly lower than in controls or old vagotomy patients. The stimulated and unstimulated acid in the recent vagotomies was significantly lower than in patients with ulcer craters or scarring. Basal pepsins in the recent vagotomies did not differ from those in the unoperated symptomatic groups. The stimulated pepsins in the recent vagotomies were marginally reduced compared to the visible crater group. They were not reduced compared to the other 2 symptomatic groups. Pentagastrin increased the secretion of pepsin in vagotomized dogs. The Heidenhain pouch does not mirror the behavior of pepsin in the intact or vagotomized stomach.

2712 BASAL AND PENTAGASTRIN-STIMULATED GASTRIC ACID SECRETION IN CHINESE, INDIAN AND MALAY SUBJECTS. A COMPARATIVE STUDY. *(E.)* Fung, W. P.; Tye, C. Y. (Univ. Singapore, Dept. Med.). *Am. J. Gastroenterol.* 60(5):488-495, 1973.

2713 GASTRIC SECRETION, GASTRITIS AND ULCER. *(E.)* Quina, M.; Mouro, A. M.; Mexia, J. (Santa Maria Univ. Hosp. Lisbon, Portugal). *Am. J. Gastroenterol.* 61(1):33-39, 1974.

2714 INTESTINAL CONTROL OF GASTRIC ACID SECRETION IN THE RAT. *(E.)* Ruderman, R. L.; Nagy, E. (Dept. Surg., Univ. Toronto, Canada). *Ann. Surg.* 179(3):376-378, 1974.

2715 PARIETAL CELL VAGOTOMY AND GASTRIC EMPTYING OF LIQUIDS IN THE DOG. *(E.)* Weddle, II., C. O.; Springfield, A. C.; Ormsbee, III., H. S.; (Dept. Surg., Univ. Wisconsin, Madison). *Arch. Surg.* 108(1):83-86, 1974.

2716 RELEASE OF MUCINS FROM PYLORIC GLANDS IN THE RAT AFTER CHOLINERGIC STIMULATION. *(Fr.)* Bottin, C.; Zeitoun, P.; Lehy, T. (Bichat Hosp., Paris, France). *Biol. Gastroenterol. (Paris)* 6(4):307-316, 1973.

2717 HISTAMINE METABOLISM AND GASTRIC SECRETION IN EXPERIMENTAL BURNS IN THE RAT. *(E.)* Svensson, S. E.; Wetterqvist, H. (Dept. Physiol Univ. Lund, Sweden). *Br. J. Exp. Pathol.* 54(6):665-672, 1973.

2718 MOBILIZATION OF GASTRIC MUCOSAL HISTAMINE AND GASTRIC SECRETION AFTER H_2-RECEPTOR BLOCKADE. *(E.)* Lundell, L. (Inst. Physiol., Univ. Lund, Sweden). *Br. J. Pharmacol.* 49(4):715-717, 1973.

2719 PROSTAGLANDIN 15 (R) 15-METHYL-E_2 METHYL ESTER FOR SUPPRESSION OF GASTRIC ACIDITY IN GRAVIDA AT TERM. *(E.)* Amy, J. J.; Jackson, D. M.; Adaikan Ganesan, P.; Karim, S. M. M. (Makerere Univ. Med. Sch., Kampala, Uganda). *Br. Med. J.* 4(5886):208-211, 1973.

2720 INVESTIGATION ON CHANGES OF PLASMA KININOGEN LEVELS IN GASTRIC RESECTION. *(Ger.)* Schneider, B.; Furstenberg, H. S.; Bussmann, J. F.; Hartung, U. (Mannheim Clin., Univ. Heidelberg, Germany). *Bruns Beitr. Klin. Chir.* 220(5):481-485, 1973.

2721 WHY DOES THE GASTRIC MUCOSA SECRETE PEPSINS AND HYDROCHLORIC ACID? *(Ger.)* Buchs, S. (Pediatr. Clin., Univ. Basel., Switzerland). *Dtsch. Med. Wochenschr.* 99(8):332-338, 1974.

2722 EFFECT OF MIANSERIN, A POTENT ANTI-SEROTONIN AGENT, ON THE ISOLATED RAT STOMACH FUNDUS PREPARATION. *(E.)* Frankhuyzen, A. L.; Bonta, I. L. (Dept. Pharmacol., Erasmus Univ., Rotterdam, Netherlands). *Eur. J. Pharmacol.* 25(1):40-50, 1974.

2723 GASTRIN: ITS ROLE IN THE GASTROENTEROLOGY CLINIC. *(Sp.)* Pajares Garcia, J. M. (Gran Hosp. del Estado, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(5):615-628, 1973.

2724 GASTRIC ACID SECRETION DURING SLEEP. *(Ger.)* Stacher, G. (Surg. Clin., Univ. Vienna, Austria). *Wien. Klin. Wochenschr.* 86(42/43):702-706, 1973.

2725 ROLE OF THE GASTRIC ANTRUM IN GASTRIC HYPERSECRETION AFTER JEJUNAL REVERSAL. *(E.)* Lulu, D. J. (VA Hosp., Des Moines, Iowa). *Am. J. Surg.* 127(3):248-249, 1974.

2726 REPRODUCTIVE FUNCTION AND THE STATE OF DIGESTIVE ORGANS. *(Rus.)* Tugolukov, V. N. (Inst. Obstet. Gynecol., Leningrad, USSR). *Vestn. Akad. Med. Nauk SSSR* 27(11):67-74, 1972.

See also 2633, 2814, 2903, 3023, 3026, 3027, 3028.

Pancreas

2727 DEGENERATION OF MOUSE PANCREATIC ACINAR CELLS DURING FASTING. *(E.)* Nevalainen, T. J.; Janigan, D. T. (Dept. Pathol., Dalhousie Univ., Halifax, Canada). *Virchows Arch.* [*Zellpathol.*] 15(2):107-118, 1974.

Ultrastructural changes in the pancreas of C57BL/10J mice were studied after 1, 2, and 3 days of fasting. A gradual decrease in zymogen granule numbers was evident after a 1 day fast and was pronounced after 2-3 days. As zymogen granule size decreased, a new population of small granules, approximately 0.2-0.3 μ in diameter, appeared in the apical cytoplasm. They were especially numerous in the vicinity of the Golgi cisternae and were apparently Golgi vacuoles filled with secretory material. Autophagic activity increased in the Golgi areas but there were no signs of intracellular degradation of zymogen granules. After a 3 day fast, focal cytoplasmic degeneration was marked and many acinar cells were nectrotic. By this time serum and pancreatic amylase levels were about 25% and 18%, resp., of the levels in nonfasted controls. The extensive degenerative changes occurring after modest periods of fasting emphasize the need for careful interpretation of experimental studies where fasting is used to establish a baseline for studies on the exocrine pancreas.

2728 UNRESPONSIVENESS OF EXOCRINE RAT PANCREAS TO CALCEMIC CHALLENGES (HYPERCALCEMIA, EDTA HYPOCALCEMIA OR CALCITONIN ADMINISTRATION) WHICH INFLUENCE STOMACH FUNCTION. *(E.)* Ziegler, R.; Minne, H.; Zwicker, M.; Hotz, J. (Ctr. Intern. Med. Pediatr., Univ. Ulm, Germany). *Res. Exp. Med. (Berl.)* 162(4):347-350, 1974.

In female albino rats secretin and pancreozymin (each 2.5 U/100 g/hr i.v.) stimulated exocrine pancreatic secretion at a level which was maintained for almost 3 hr. Pancreatic enzyme secretion was not altered by hypercalcemia induced by calcium gluconate (2 mg Ca^{++}/100 g/hr i.v.), Na_2EDTA (5 mg/100 g/hr i.v.), or porcine thyrocalcitonin (200 MRCmU/100 g/hr i.v.). Administration of calcium increased serum calcium by 2.5 mEq/liter, while administration of EDTA and thyrocalcitonin decreased it by 1.5 mEq/liter. The unresponsiveness of the rat pancreas to calcium stimulation is in contrast to the reaction of the human pancreas and also to the reaction of the rat stomach. The reason for these organ and species differences is not known.

2729 HORMONAL AND DIETARY ADAPTATION OF RAT PANCREATIC HYDROLASES BEFORE AND AFTER WEANING. *(E.)* Deschodt-Lanckman, M.; Robberecht, P.; Camus, J.; Baya, C.; Christophe, J. (Brussels Univ. Sch. Med., Belgium). *Am. J. Physiol.* 226(1):39-44, 1974.

All levels of digestive enzymes did not change in constant proportion in the pancreas of albino rats before weaning, and different stimuli were probably responsible for their emergence. The high levels of amylase and chymotrypsinogen observed during the late fetal period were followed by a marked depression in the newborn period. Prompt administration of hydrocortisone (5 mg/100 g for 7 days, i.p.) prevented the drop of these hydrolases and enhanced the low activity of trypsinogens in 1- to 23-day-old pups. This observation together with the reported decreasing activity of the pituitary-adrenal axis during the first neonatal weeks suggests that glucocorticoid secretion is a stimulus effective in evoking a series of pancreatic hydrolases. The emergence of lipase was slow, responding poorly to hydrocortisone and to nutritional controls only after 25 days. L-Thyroxine (2 μg i.p.), glucagon (50 μg i.p.) or dibutryryl cyclic AMP (125 μg i.p.) were unable to increase the specific activities of all hydrolases tested. Nutritional controls were predominant in regulating levels of hydrolases in adult rats. The time course of variation in specific activities of amylase and lipase on high-corn oil and high-starch diets was unaffected by 7 days of glucagon administration. Adrenalectomy tended to decrease and hydrocortisone treatment tended to increase the level of pancreatic amylase in rats submitted to the same dietary manipulations. The accumulation of amylase required the presence not only of starch but also of protein in the diet.

2730 BILIARY AMYLASE OUTPUT IN RATS WITH PANCREATIC DUCT OBSTRUCTION AND CCL_4-INTOXICATION. *(E.)* Maezawa, H.; Ogawa, S.; Ito, Y. (Tokyo Med. Dental Univ., Japan). *Proc. Japan Acad.* 49(3):208-212, 1973.

The effects of hyperamylasemia *in vivo* on biliary amylase output were examined in rats with special attention to the interrelations among bile flow, plasma amylase level, and biliary amylase. Experimental hyperamylasemia was produced by pancreatic duct obstruction and by CCl_4-intoxication. Amylase level in the bile was elevated. There was a positive correlation to plasma amylase level in rats with pancreatic duct obstruction or chronic CCl_4-intoxication. Biliary amylase output was increased and there was a positive correlation to amylase level in the bile in untreated rats and in rats with pancreatic duct obstruction. However, in rats with chronic CCl_4-intoxication there was no significant increase in biliary amylase output although amylase level was significantly elevated both in the bile and in the blood plasma. Amylase level in the bile was elevated by chronic CCl_4-intoxication, and there was a positive correlation with plasma levels of transaminase. A significant decrease in urinary excretion of amylase was also observed in rats with chronic CCl_4-intoxication. The results in the CCl_4-treated subgroup suggested that biliary amylase level was elevated secondarily to the high plasma amylase level which was probably due to the decrease in urinary output. The increase in biliary amylase output, which was most probably due to the decrease in bile flow, revealed no statistically significant difference from that in the control subgroup.

2731 EXOCRINE PANCREATIC INSUFFICIENCY: A NEW RECESSIVE MUTATION IN MICE.

(E.) Pivetta, O. H.; Green, E. L. (Jackson Lab., Bar Harbor, Me.). *J. Hered.* 64(5):301-302, 1973.

Spontaneous exocrine pancreatic insufficiency was found in 3 of 2329 inbred CBA/J mice and in none of 15,462 mice from 12 other inbred strains. The affected animals were found in 3 litters from 3 different brother-sister matings; all affected animals traced back to a common ancestral pair a few generations earlier. The segregation data from matings within the CBA/J strain support the contention that the trait is due to an autosomal recessive mutation, while segregation data from outcross matings indicate that other genes affect the expression of the trait. The affected homozygotes are recognized at 2 to 3 weeks of age by their small body size and yellow, fatty feces. The feces have almost no trypsin-like activity and have an elevated total fat content. The pancreatic tissue is almost completely replaced by fat, but the islets of Langerhans appear histologically normal. The blood glucose levels are below normal, although no glycosuria has been detected.

2732 PANCREATIC PERFUSION IN THE PATHOPHYSIOLOGY OF HEMORRHAGIC SHOCK.

(E.) Spath, Jr., J. A.; Gorczynski, R. J.; Lefer, A. M. (Univ. Virginia Sch. Med., Charlottesville). *Am. J. Physiol.* 226(2):443-451, 1974.

The *in situ* hemodynamically isolated, autoperfused, or pump-perfused pancreas of mongrel dogs was used to study the effect of hemorrhage on pancreatic blood flow, pancreatic resistance, plasma proteolysis, and the plasma activity of a myocardial depressant factor. In autoperfused dogs, pancreatic blood flow fell 82% early in shock and remained at this level throughout 3 hr of oligemia. Pancreatic ischemia was associated with a 2- to 3-fold increase in β-glucuronidase activity and amino N levels in plasma, a 27-fold increase in cathepsin D activity, and a 3- to 4-fold increase in myocardial depressant factor activity. Pump perfusion of the pancreas at normal flow during shock limited the increases in the activities of β-glucuronidase and cathepsin D and in amino-N concentration of plasma to half that found in autoperfused hemorrhaged dogs and almost completely prevented the rise in plasma myocardial depressant factor activity. Nevertheless, pancreatic vascular resistance rose 71%, with active constriction evident during the first hr of hemorrhage. These results indicate that severe prolonged pancreatic hypoperfusion contributes significantly to lysosomal disruption, proteolysis, and production of myocardial depressant factor and therefore to the deleterious sequelae of circulatory shock.

2733 EXOCRINE SECRETORY RESPONSES OF THE PANCREAS TO PENTAGASTRIN AND TO A MEAT MEAL IN DOGS.

(E.) Gupta, S.; Elder, J. B.; Gillespie, I. E. (Western Infirm., Glasgow, Scotland). *Digestion* 9(6): 482-489, 1973.

The pancreatic responses of 4 dogs with pancreatic and gastric fistulae were studied with i.v. infusion of pentagastrin in doses maximal for gastric acid secretion (4-8 μg/kg/hr), and separately with a 400-g meat meal. With the gastric fistula open, there was a small increase in pancreatic bicarbonate, and a marked increase in protein output, after pentagastrin. With the gastric fistula closed, bicarbonate and protein outputs to pentagastrin were not significantly different from those seen in response to a meat meal. These results suggest that when the gastric fistula is closed, pentagastrin infusion at doses maximal for gastric acid secretion stimulates the pancreas to a degree closely similar to that produced by a 400-g meat meal. This similiarity may be due to a combination of a direct action of pentagastrin on the pancreas and an indirect action by means of gastric acid secretion reaching the duodenum and causing secretin release.

2734 THE INFLUENCE OF THE SPLANCHNIC NERVES ON THE EXTERNAL SECRETION, BLOOD FLOW AND ELECTRICAL CONDUCTANCE OF THE CAT PANCREAS.

(E.) Barlow, T. E.; Greenwell, J. R.; Harper, A. A.; Scratcherd, T. (Dept. Anat. Physiol. Univ. Newcastle upon Tyne, England). *J. Physiol.* 236(2): 421-433, 1974.

Electrical stimulation of the cut peripheral end of the splanchnic nerves of cats results in a biphasic change in electrical conductance measured across the tail of the pancreas. A phase of decreased conductance is followed by a more prolonged phase of increased conductance. Simultaneous measurements of pancreatic blood flow indicate that the phase of decreased conductance is a result of vasoconstriction, while the phase of increased conductance is due to vasodilatation. The initial phase of decreased conductance and vasoconstriction is abolished by α-receptor blocking agents such as phenoxybenzamine (0.5-20 mg i.v.) and the phase of increased conductance blocked by β-receptor blocking agents such as pronethalol (0.5-10 mg i.v.). Short periods of electrical stimulation applied to the splanchnic nerves result in a secretion of amylase and a reduction in the volume rate of secretion. When the vasoconstrictor response was abolished by phenoxybenzamine, nerve stimulation still reduced the rate of secretion, suggesting that the inhibitory effect is in part due to a direct action of the secretory cells. After bretylium tosylate (0.4-12.4 mg i.v.), splanchnic nerve stimulation no longer produced vasomotor changes in the pancreas and the inhibitory effect on the volume response was converted to one of augmentation, but the secretion of enzymes was unaffected. The secretion of amylase on splanchnic stimulation was abolished by atropine (1 mg/kg i.v.), suggesting that a cholinergic mechanism is involved. Noradrenaline(5 μg/kg) did not mobilize pancreatic enzymes.

2735 EFFECT OF ACTINOMYCIN D, PANCREOZYMIN AND SECRETION ON RNA SYNTHESIS AND PROTEIN SYNTHESIS MEASURED IN VIVO IN RAT PANCREAS.

(E.) Reggio, H.; Cailla, H. L. (Univ. Provence, Marseille, France). *Biochim. Biophys. Acta* 338(1):37-42, 1974.

The effect of actinomycin (2 mg/kg i.p.) on RNA synthesis in pancreas of Wistar rats was studied with or without pentobarbital, secretin, and pancreozymin. Actinomycin alone inhibited (^{3}H)adenine incorporation into salt-insoluble RNA by 96.3%. Similar inhibition of RNA synthesis occurred when actinomycin was injected into rats treated with pentobarbital (60 mg/kg i.p.) or given pentobarbital and infused with secretin and pancreozymin (0.75 Ivy dog U/kg/hr). Treatment with pentobarbital alone induced a 70% decrease in (^{3}H)adenine incorporation; a similar decrease occured when rats were infused with pancreozynin and secretin in addition to pentobarbital. When (^{3}H)adenine was replaced by (^{32}P)orthophospate, similar results were obtained with both pancreas and liver. Incorporation of L-(^{14}C)valine into protein decreased by about 50% when rats were treated for 4 hr with actinomycin. Pentobarbital alone or in the presence of the secretogogue hormones reduced valine incorporation by 80%. Pancreozymin enhanced protein synthesis and its effect was not modified by actinomycin. Stimulation of protein synthesis by pancreozymin even in the absence of any DNA-dependent RNA synthesis suggests that the hormone does not act at the level of the transcription process. It is proposed that pancreozymin induces an increase in the number of active mRNA molecules or acts at the level of the translation process.

2736 EFFECT OF AMINONUCLEOSIDE ON THE ACTIVITY OF PANCREATIC PROTEASES. *(E.)* Mayer, M.; Ochieng, N.; Khassis, S.; Shafrir, E. (Hebrew Univ.-Hadassah Med. Sch., Jerusalem, Israel). *Biochim. Biophys. Acta.* 338(2):447-457, 1974.

The activation of trypsinogen and chymotrypsinogen was studied in pancreatic extracts from normal male albino rats and from hypoproteinemic rats given 7 daily s.c. injections of 2.0 mg/100 g aminonucleoside of puromycin [6-dimethylamino-9-(3'-amino-3'-deoxy-β-D-ribofuranosyl)-purine]. Upon incubation of the pancreatic extracts, the usual 2-3 hr lag phase of the sigmoidal-shaped activation curve was almost abolished in the aminonucleoside-treated rats. The maximal activity of the two proteases obtained after complete activation was unaffected. The early onset of the autocatalytic appearance of tryptic or chymotryptic activity appeared to be due to the presence of preformed trypsin-like activity in the pancreatic extracts of the aminonucleoside-treated animals. A short-term treatment with aminonucleoside (single 6 mg/100 g dose), which did not lead to proteinuria and hypoproteinemia, also resulted in an increased trypsin/trypsinogen ratio in the pancreas and a shortening of the lag period. A direct concentration-dependent effect of the drug was demonstrated in *in vitro* experiments, showing a release of hydrolytic enzymes from isolated pancreatic zymogen granules. A direct effect of aminonucleoside on the pancreas may also be involved in the protease-induced membrane labilization seen after aminonucleoside treatment.

2737 THE EFFECT OF ETHIONINE ON THE ENERGY-PRODUCING METABOLISM IN THE RAT PANCREAS. II. ALTERATIONS OF TISSUE LEVELS OF ADENINE NUCLEOTIDES, PYRIDINE NUCLEOTIDES, AND GLYCOLYTIC METABOLITES. *(E.)* Goebell, H. (Dept. Intern. Med., Univ. Ulm, Germany). *Horm. Metab. Res.* 6(1):44-49, 1974.

The effect of 4 different does of d,l-ethionine (0.05 mg, 0.25 mg, 0.5 mg, and 1 mg/g body weight) on pancreatic tissue levels of ATP, ADP, AMP, nicotinamide adenine dinucleotide, phosphate and glycolytic metabolites 5 hr after i.p. application was investigated in female Wistar rats. Doses of 0.25-1 mg resulted in a similar, significant decrease in level of adenine and pyridine nucleotides and of most substrates measured. The content of lactate was increased, as was the lactate/pyruvate ratio. These effects were also present after a dose of 0.05 mg/kg but were far less marked. This indicates a saturation of the mechanism responsible for the deficit of nucleotides when the dosage exceeds 0.25 mg/g. One mg ethionine/g induced the same alterations even after 2 hr. They were still present 12 hr after administration. In 2 experiments, 0.05 mg and 0.25 mg/g of ethionine were given i.p. once daily over period of 4 days; on the fourth day, the same metabolic alterations were found in the pancreas which had been seen 5 hr after application of 0.25-1 mg/g. The reduction of the tissue content of ATP to about 50% of the control level is the main cause of a disturbance in the intracellular enzyme transport, leading to an accumulation of enzyme protein in the cells. However, it is not the sole cause of this phenomenon or of the progressive destruction of the cell, as these phenomena are dependent on the applied dose of ethionine. The metabolic alterations are not dose dependent above a certain saturating level of the toxic agent.

2738 PURE CHOLECYSTOKININ: PANCREATIC PROTEIN AND BICARBONATE RESPONSE. *(E.)* Debas, H. T.; Grossman, M. I. (Univ. California Sch. Med., Los Angeles). *Digestion* 9(6):469-481, 1973.

In dogs with chronic pancreatic fistulas, pure cholecystokinin (3000 Ivy dog μ), a highly purified variant, 20% pure cholecystokinin, an octapeptide of cholecystokinin, and caerulein all gave the same high maximal protein outputs and low maximal bicarbonate outputs. Ten percent pure cholecystokinin gave higher bicarbonate output than can be achieved with pure cholecystokinin. By intestinal perfusion, HCl gave greater protein output than can be achieved with secretin alone; sodium oleate gave greater bicarbonate output than can be achieved with pure cholecystokinin alone; and tryptophan gave maximal bicarbonate output less than that of pure cholecystokinin. On the hypothesis that intestinally perfused stimulants act solely by release of secretin and cholecystokinin, the effects of tryptophan can be accounted for by release of cholecystokinin alone, of HCl by release mainly of secretin plus small amounts of cholecystokinin, and of oleate by release mainly of cholecystokinin plus small amounts of secretin.

2739 THE EFFECT OF ISOPROTERENOL ON ENZYME SECRETION FROM THE ISOLATED PERFUSED CAT PANCREAS. *(E.)* Pederson, R.; Schulz, I. (Max Planck Inst. Biophys., Frankfurt, Germany). *Biochim. Biophys. Acta* 338(2):440-446, 1974.

The effects of D-(-)-propranolol, L-(+)-propranolol, choline chloride, phentolamine, and eserine sulfate on the enzyme secretion induced by acetylcholine, cholecystokinin-pancreozymin, and isoproterenol were studied in the isolated perfused feline pancreas. The pancreatic secretion of amylase was stimulated by acetylcholine (100 mg), cholecystokinin-pancreozymin (0.25 Ivy Dog U), and isoproterenol (10-50 μg). The isoproterenol-induced secretory response was abolished by the D-(-)-, but not the L-(+)-form, of the β-adrenergic blocker propranolol (10^{-5} M). The isoproterenol-induced response was also inhibited by atropine (1.4 X 10^{-7} M), but was unaffected by the α-blocking agent phentolamine (10^{-5} M). When the amylase response to isoproterenol was exhausted, it returned following perfusion of the pancreas with eserine sulfate (5 mg/liter) and choline chloride (3 mg/liter); neither eserine sulfate nor choline chloride were effective alone. The data indicate that isoproterenol acts on pancreatic β-receptors and that endogeneously released acetylcholine is responsible for the enzyme secretion.

2740 THE EFFECT OF VARIOUS SECRETAGOGUES ON ACCUMULATION OF CYCLIC AMP AND SECRETION OF α-AMYLASE FROM RAT EXOCRINE PANCREAS. *(E.)*

Heisler, S.; Grondin, G.; Forget, G. (Dept. Physiol., Univ. Sherbrooke, Canada). *Life Sci.* 14(4):631-639, 1974.

The effect of various secretagogues on accumulation of cyclic AMP was studied in relation to their ability to stimulate secretion of α-amylase in rat pancreatic fragments. Carbachol significantly lowered the tissue content of cyclic AMP in the pancreas from the third to the fifth minute of incubation. The response to pancreozymin was biphasic. An initial stimulation with a peak percentage increase in nucleotide levels was observed after 2 min of incubation. There followed a subsequent decrease in nucleotide levels; after 5 min of incubation, the cyclic AMP levels in pancreozymin-stimulated tissue was signficantly lower than in the controls. Theophylline increased tissue AMP by 85% after 1 min of incubation. Secretin also increased cyclic AMP content within the first minute of incubation. Secretion of α-amylase from unstimulated tissue was fairly constant throughout the experiment. Theophylline did not significantly stimulate secretion of α-amylase from the pancreas. Carbochol increased the output of α-amylase even after 1 min of incubation. Pancreozymin stimulated secretion of α-amylase beginning at the fifth minute of incubation. Secretin increased the release of α-amylase over control values at each point of observation (after 1 min to 10 min of incubation).

2741 SELECTIVE PANCREATIC ENZYME SECRETION DUE TO A NEW PEPTIDE CALLED CHYMODENIN. *(E.)*

Adelson, J. W.; Rothman, S. S. (Dept. Physiol., Univ. California, San Francisco). *Science* 183(4129):1087-1089, 1974.

The effect of i.v. administration of a newly isolated peptide, chymodenin, purified from porcine duodenum, upon the secretion of enzyme from the pancreas of the anesthetized rabbit was studied *in situ*. Administration of the peptide dramatically increased the secretion of chymotrypsinogen (ChTg) within 15 min, whereas lipase output remained unchanged and only a modest increase in protein output was observed. Male albino New Zealand rabbits were anesthetized. After cannulation of the pancreatic duct and an initial 1-hr stabilization period, secretion was collected for sequential 20-min periods, and all collected samples were analyzed for protein, ChTg, lipase, and fluid output. Chymodenin was administered i.v. at a dose of 10 μg in 1.0 ml of 0.9% NaCl per animal. Chymotrypsinogen output was increased approximately 3-fold following chymodenin administration in the basal lipase output range. Even in endogenously stimulated glands, the relative proportion of ChTg in the secreted protein mixture increased in some experiments. Within the first 15-min period, ChTg specific activity increased above the preceding preinjection period and returned to or below preinjection levels by 45 to 60 min. The response was clearly visible at the lowest dose employed, 100 ng of chymodenin/kg of body weight. As expected, pancreatic lipase output in the basal range was not augmented by injection of the peptide. Injection of chymodenin also increased protein output by about 40% in this range of low lipase output. In endogenously stimulated samples, no enhancement of ChTg or protein was observed following peptide injection. Mean lipase output was lower in the endogenously stimulated range, but not significantly lower. *In vitro* studies on the effect of chymodenin on enzyme output by the rabbit pancreas show a response similar to the *in situ* studies: a marked increase in ChTg output, no change in lipase secretion, and a moderate protein response. The observation that a peptide, chymodenin, purified from duodenal extracts elicits a specific increase in ChTg secretion from the exocrine pancreas suggests that the regulation of digestive enzyme secretion may be enzyme-specific and raises the possibility that other peptides with analogous functions may exist.

2742 CONCENTRATION OF PANCREOZYMIN AS A DETERMINANT OF THE EXOCRINE-ENDOCRINE PARTITION OF PANCREATIC ENZYMES. *(E.)*

Saito, A.; Kanno, T. (Fac. Vet. Med., Hokkaido Univ., Sapporo, Japan). *Jap. J. Physiol.* 23(5):477-495, 1973.

The 'exocrine-endocrine partition' of enzymes and their precursors was investigated in both the isolated and perfused rat pancreas, and the rat pancreas *in situ*. The release of amylase was accompanied by the release of precursors of proteolytic enzymes either into the common duct or into the portal vein, and it was measured as a representation of release of pancreatic enzymes. When the isolated pancreas was perfused with Krebs-Henseleit solution containing pancreozymin 0.2 U/ml, the amylase output into the common duct was markedly increased, whereas the output into the vein was slightly increased. When the concentration of pancreozymin was increased to 1.5 U/ml, the output into the vein was markedly increased in contrast to a small increase in the output into duct. Corresponding with the increase in output into the vein, acinar cells exhibiting high effective membrane resistances increased in number during perfusion of pancreozymin at a high concentration. Enhanced release due to pancreozymin into the vein and into the duct was negated when calcium was omitted from the perfusing medium. As a high dose of pancreozymin was injected repeatedly into the rat *in situ,* the blood concentration of amylase became higher but the increase in the output into the common duct became lower. It is concluded that pancreatic enzymes and precursors preserved in zymogen granules may be extruded into the acinar lumen by the common calcium-dependent cellular processes; then, some of the secretory products may leak into the portal vein *via* enlarged intercellular spaces when a high concentration of pancreozymin is present.

2743 THE EFFECTS OF GLUCAGON ON THE EXOCRINE SECRETION OF THE PERFUSED CANINE PANCREAS. *(E.)* Murphy, J. J.; McGeeney, K. F. (Dept Surg., Univ. College, Dublin, Ireland). *Ir. J. Med. Sci.* 143(1):37-41, 1974.

The action of glucagon (1 mg) on exocrine secretion of the totally isolated extracorporeal hemoperfused pancreas was studied in 19 mongrel dogs. The response to secretin (IU) and secretin plus glucagon were not significantly different for volume, amylase, lipase, and trypsin. The effect of glucagon on the pancreatic secretory response to CCK-Pz (6U) was not statistically significant. Following a large dose of secretin (20U) and CCK-Pz, there was a significant increase in the mean amylase output and in trypsin output. These results do not indicate an inhibitory role for glucagon in the isolated canine pancrease. From the amylase and trypsin responses to the combined secretin/CCK-Pz doses, it is possible that glucagon exerts some potentiation.

2744 DIRECT EFFECTS OF ALCOHOL ON IN VIVO AND IN VITRO EXOCRINE PANCREATIC SECRETION AND METABOLISM. *(E.)* Solomon, N.; Solomon, T. E.; Jacobson, E. D.; Shanbour, L. L. (Univ. Texas Med. Sch., Houston). *Am. J. Dig. Dis.* 19(3):253-260, 1974.

The effects of alcohol on *in vivo* and *in vitro* pancreatic secretion and cellular metabolism were studied in New Zealand white rabbits. I. v. ethanol (1 g/kg over 30 min) inhibited pancreatic secretion of water and bicarbonate and reduced tissue ATP content, but had no significant effect on protein secretion or tissue cyclic AMP content. Peak blood alcohol level after i.v. infusion was 70 mg/100 ml and correlated in each animal with the period of maximal inhibition of secretion. Ethanol, 3% (w/v), in the bathing fluid of the *in vitro* rabbit pancreas decreased water, bicarbonate, and protein output by 3%; greatly reduced tissue ATP content; and had no effect on cyclic AMP levels. These results support a hypothesis of inhibition of exocrine pancreatic secretion by a direct effect of ethanol on secretory cells and suggest that cellular metabolism is the locus of ethanol's action.

2745 THE EFFECTS OF INTRAGASTRIC ETHANOL ADMINISTRATION UPON CANINE EXOCRINE PANCREATIC SECRETION. *(E.)* Tiscornia, O. M.; Gullo, L.; De Barros Mott, C.; Devaux, M. A.; Palasciano, G.; Hage, G.; Sarles, H. (Res. Unit Digestive Pathol., INSERM, Marseille, France). *Digestion* 9(6):490-501, 1973.

The effects of intragastric administration of ethanol on exocrine pancreatic secretion were assessed in 11 mongrel dogs provided with gastric and pancreatic fistulas (Thomas cannula). The gastric fistula was left open throughout the experiments to prevent gastric content from entering the duodenum. Ethanol (12% in saline) decreased the protein concentration and the output of basal pancreatic secretion. Ethanol (40% in saline) showed no effect on pancreatic secretion stimulated by a continuous i.v. injection of GIH secretin (1.0 U/kg/hr but produced a significant increase in protein concentration and output when pancreatic secretion was stimulated by a continuous i.v. injection of Boots secretin (4.0 U/kg/hr). Intragastric infusion of 80% (v/v) ethanol under i.v. injection of GIH secretin (1.0 U/kg/hr) produced an inhibition of the flow rate and alkaline secretion and a significant increase in protein concentration and output. The latter response was suppressed by previous antrectomy.

2746 RELATIONS BETWEEN EXOCRINE PANCREATIC FUNCTION AND THE CALCIUM BALANCE IN MAN. *(Ger.)* Hotz, J.; Minne, H.; Ziegler, R. (Ctr. Intern. Med. Pediatr., Univ. Ulm, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1420-1423, 1972.

2747 INTERACTION OF PHOSPHOLIPASE A_2 AND ITS ZYMOGEN WITH DIVALENT METAL IONS. *(E.)* Pieterson, W. A.; Volwerk, J. J.; De Haas, G. H. (Biochem. Lab., State Univ. Utrecht, The Netherlands). *Biochemistry* 13(7):1439-1445, 1974.

2748 PANCREATIC NONSPECIFIC LIPASE, AN ENZYME HIGHLY SPECIFIC FOR MICELLES. *(E.)* Albro, P. W.; Latimer, A. D. (Natl. Inst. Health, Res. Triangle Park, N.C.). *Biochemistry* 13(7):1431-1439, 1974.

2749 EFFECT OF MINERALOCORTICOIDS ON EXOCRINE SECRETION OF THE PANCREAS. *(Rus.)* Nazarova, G. G.; Fomina, L. S. (Inst. Nutr., Moscow, USSR). *Probl. Endokrinol. (Mosk.)* 19(3):78-81, 1973.

2750 ANTIOXIDATIVE ACTIVITY OF THE PANCREAS AND CHANGES IN ITS ISLET CELLS DURING ADMINISTRATION OF 3,4-BENZPYRENE AND ANTHRACENE. *(Rus.)* Samsonidze, T. G.; Tsartsidze, M. A.; Samsonidze, G. G. (A. N. Natishvili Inst. Exp. Morphol., Acad. Sci. Georgian SSR, USSR). *Soobshcheniia Akad. Nauk Gruz. SSR* 73(1):217-219, 1974.

2751 EXPERIMENTAL CONTRIBUTION TO THE STUDY OF PANCREATIC POLYSEROSITIS. EFFECT OF UNILATERAL PHRENICECTOMY AND INTRAPLEURAL INJECTIONS OF TRYPSIN ON THE DISTRIBUTION OF EFFUSIONS. *(Fr.)* Warter, J.; Storck, D.; Warter, A. (Univ. Hosp. Ctr., Strasbourg, France). *C. R. Soc. Biol. (Paris)* 167(10):1466-1471, 1973.

See also 3023, 3330.

SECRETION AND METABOLISM

Hepatobiliary Tract

2752 THE METABOLISM OF THE ISOLATED PERFUSED CANINE LIVER. *(E.)* Bhanalaph, T.; Sampson, D.; Murphy, G. P. (Roswell Park Mem. Inst., Buffalo, N. Y.). *Cryobiol.* 10(6):497-501, 1973.

Adult mongrel dogs were divided into 6 treatment groups: Group 1, liver perfusion; Group 2, deoxycorticosterone acetate (1 mg/day i.m.) for 7 days prior to liver perfusion; Group 3, testosterone (50 mg/day i.m.) for 7 days prior to liver perfusion; Group 4, carbon tetrachloride (5 ml p.o.) every day for 5 days prior to liver perfusion; Group 5, right thoractomy for partial constriction of the intrathoracic inferior vena cava prior to liver perfusion; Group 6, common bile ligation prior to liver perfusion. The mean liver oxygen consumption did not differ significantly between Groups 1-4, while the oxygen consumption was not significantly increased in Group 5 and significantly increased in Group 6. The carbon dioxide production from anaerobic metabolism did not differ among the groups. When fructose was added to the incubation substrate, the production of carbon dioxide decreased significantly in groups 4 and 6 and decreased nonsignificantly in group 2. These data point up the hazard in relying on hepatic metabolic performance to differentiate between the presence or absence of certain disease states or drug treatments known to have important hepatic consequences.

2753 ALCOHOL AND SUCROSE IN CHOLINE DEFICIENCY CIRRHOSIS IN THE RAT. *(E.)* Patek, Jr., A. J.; Bowry, S. C.; Anuras, S. (VA Hosp., Boston, Mass.). *Arch. Pathol.* 96(6):377-382, 1973.

Weanling male Wistar rats were maintained on protein and choline deficient liquid diets in which alcohol constituted 35% of the total calories. A second group of rats was maintained on a liquid diet in which sucrose replaced the alcohol isocalorically. The sucrose fed rats developed cirrhosis, while the alcohol fed animals developed minimal fatty changes in the liver and showed no increase in connective tissue. The mechanism of this inhibitory effect is not clear. The alcohol may have increased the degree of inanition or decreased the metabolic activity to such a degree that the need for choline became minimal. In an experimental model combining choline deficiency and alcohol excess, the interplay of these two hepatotoxic factors may distort the effect of either factor alone on the liver.

2754 HYDROXYLATION OF TAUROLITHOCHOLATE BY ISOLATED HUMAN LIVER MICROSOMES. I. IDENTIFICATION OF METABOLIC PRODUCT. *(E.)* Trulzsch, D.; Roboz, J.; Greim, H.; Czygan, P.; Rudick, J.; Hutterer, F.; Schaffner, F.; Popper, H. (Mt. Sinai Sch. Med., City Univ. New York, N.Y.). *Biochem. Med.* 9(2):158-166, 1974.

Liver microsomes prepared from human biopsy specimens were incubated with reduced nicotinamide adenine dinucleotide phosphate and taurolithocholate. The microsomes hydroxylated the taurolithocholate, with the hydroxylation occurring in the 6α position. The reaction product was identified as hyodeoxycholic acid. The identification was based on the following observations: the product formed during the incubation of taurolithocholate with isolated microsomes was shown in terms of its molecular weight and molecular composition to be a dihydroxy bile acid; the gas chromatographic retention times of the TFA and TMS derivatives of the produce were the same as that of hyodeoxycholic acid; and the mobility of the product during thin-layer chromatography was identical with that of hyodeoxycholic acid methyl ester but quite different from the mobility of the methyl ester of its 6β isomer, 3α-6β-dihydroxy-5β-cholanoic acid.

2755 EFFECT OF BILIARY TRACT OBSTRUCTION ON LIVER MICROSOMES IN THE RAT. *(E.)* Auranen, A.; Ahonen, J.; Hvitfelt, J. (Dept. Surg., Univ. Turku, Finland). *Eur. Surg. Res.* 5(3):228-232, 1973.

The common bile ducts of adult Wistar rats were ligated and the liver microsomes were prepared 3, 6, or 9 days later. The ligation of the ductus choledochus resulted in a significant increase in liver weight. The liver DNA content did not decrease, but the microsomal protein content did decrease, as did the activity of liver glucose-6-phosphatase and the demethylation of aminopyrine. Reductions were also seen in hexobarbital metabolism, microsomal RNA and phospholipid levels, microsomal cytochrome P-450 levels, reduced triphosphopyridine nucleotide-cytochrome C reductase activity, and the incorporation of ^{14}C-glycine into microsomal protein. The microsomal cytochrome b5 content did not decrease. The data indicate the disturbances in the protein synthesizing systems are seen only after 9 days of ligation.

2756 THE EFFECTS OF PERFUSION, AMINO ACIDS AND HORMONES ON THE FREE AND ENDOPLASMIC RETICULUM-BOUND RIBOSOMES OF RAT LIVER. *(E.)*

Kelman, L.; Saunders, S. J.; Wicht, S.; Firth, L. O'C. (Dept. Med., Univ. Cape Town, South Africa). *S. Afr. Med. J.* 47(38):1751-1753, 1973.

The effects of glucose, insulin, cortisone, pancreozymin, secretin, gastrin, growth hormone, glucagon, testosterone, and various amino acids on the free and endoplasmic reticulum-bound ribosomal profiles in the isolated perfused rat liver were studied. Both ribosomal populations disaggregated progressively during perfusion. Single amino acids failed to influence the ribosomal profile; however, arginine, asparagine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, threonine, tryptophan, and valine in combination prevented the ribosomal disaggregation. The ribosomal profiles were not influenced by the infusion of growth hormone, cortisone, insulin, secretin, gastrin, glucagon, or glucose plus insulin. The ribosomal profiles of livers derived from fasted rats did not differ from those of livers derived from well-fed rats.

2757 LIVER CELLS IN SUSPENSION SYNTHESIZE BUT DO NOT SECRETE THE NEWLY SYNTHESIZED SERUM ALBUMIN. *(E.)*

Hussain, L. F.; Bhargava, P. M. (Regional Res. Lab., Hyderabad, India). *Arch. Biochem. Biophys.* 161(1):153-160, 1974.

Liver cells from inbred albino rats were prepared in suspension using a mechanical dispersion method. The cells incorporated labeled amino acids into serum albumin at a rate comparable to that observed in slices from unperfused and citrate-perfused liver over a 2-hr period. However, while the slices secrete about 89% of the newly synthesized albumin into the medium, the cell suspension secrete only 9%. This blockage affects only the secretion of albumin which is synthesized after dispersion of the tissue and does not extend equally to albumin synthesized prior to dispersion of the tissue to a single cell suspension or to other proteins synthesized in the cell suspensions. The reason for the loss in the ability of the liver cell suspensions to secrete the newly synthesized albumin is unknown.

2758 HEPATOCYTE PROLIFERATION AND α_1-FETOPROTEIN IN PREGNANT, NEONATAL, AND PARTIALLY HEPATECTOMIZED RATS. *(E.)*

Sell, S.; Nichols, M.; Becker, F. F.; Leffert, H. L. (Univ. California at San Diego Med. Sch., La Jolla). *Cancer Res.* 34(4): 865-871, 1974.

Serum α_1-fetoprotein concentrations were monitored in pregnant rats from conception through delivery and during the following 3-4 weeks postpartum and in the sera of neonatal rats from birth through maturity. The kinetic changes in the α_1-fetoprotein concentrations of partially hepatectomized rats were also monitored and the proportions of DNA-synthesizing hepatocytes in newborn and regenerating livers were correlated with serum α_1-fetoprotein concentrations. Increasing α_1-fetoprotein concentrations follow rounds of hepatocellular proliferation, indicating that the production of α_1-fetoprotein is closely coupled to cellular division. Thus, α_1-fetoprotein is either synthesized transiently and released by a postmitotic cell or it is synthesized prior to mitosis and released after mitosis. There is also evidence that proliferation is not absolutely necessary for α_1-fetoprotein production to occur.

2759 GLUCAGON CONTROL OF CYCLIC AMP ACCUMULATION IN ISOLATED INTACT RAT LIVER PARENCHYMAL CELLS *IN VITRO*. *(E.)*

Christoffersen, T.; Berg, T. (Inst. Pharmacol., Univ., Oslo, Norway). *Biochim. Biophys. Acta* 338(2):408-417, 1974.

Cyclic AMP levels were measured in suspensions of isolated Wistar rat liver parenchymal cells during *in vitro* incubation. Glucagon caused a rapid elevation in the cyclic AMP content. With 1.4×10^{-6} M (5 μg/ml) of the hormone, the levels increased about 10-fold during the first minute, after which the elevation rate was less rapid. Maximal values were reached after 5-10 min. Theophylline (2 or 5 mM) slightly increased the basal cyclic AMP levels and markedly augmented the response to glucagon. The major portion of the cyclic AMP was located within the cells, but a significant fraction was present in the incubation medium, and the relative amount present extracellularly increased with incubation time. Significant elevation of the cyclic AMP levels was produced by glucagon in concentrations greater than or equal to 1.4×10^{-10} M, and half-maximal stimulation occurred at about 2×10^{-9} M. The initial rate of cyclic AMP accumulation was much more rapid in the parenchymal cells than in slices of liver, and the maximal levels obtained were about 3 times higher. Preparations of parenchymal liver cells are useful in studying the actions of glucagon on liver tissue.

2760 LIVER INJURY FOLLOWING HALOTHANE ANESTHESIA IN PHENOBARBITAL-PRETREATED RATS. *(E.)*

Reynolds, E. S.; Moslen, M. T. (Peter Brigham Hosp., Boston, Mass.). *Biochem. Pharmacol.* 23(2):189-195, 1974.

Linear foci of centrolobular necrosis on the posterior aspect of the liver were consistently produced by 5 hr of anesthesia with 0·85% halothane in young male Charles River rats pretreated with phenobarbital (1 g/liter drinking water) for 30 days. Microsomes isolated from livers of these animals immediately upon completion of anesthesia had elevated lipid-conjugated diene and decreased cytochrome P-450 content and ^{14}C-glycine incorporation into protein *in vivo*. Lipid-conjugated dienes and glycine incorporation, but not P-450, returned to pre-anesthesia levels within 2 hr. None of these alterations was evident after anesthesia in livers of saline-pretreated rats (0·23 g NaCl/liter drinking water). Aside from the persistence of decreased P-450 in phenobarbital-pretreated animals, alterations in lipid-conjugated diene and glycine incorporation did not occur after repeated anesthesia at 48-hr intervals, nor was hepatic necrosis as evident, although anesthesia recovery times increased significantly. These findings indicate that metabolites of halothane are

rectly hepatotoxic and that repeated anesthesia
th halothane at 2-day intervals decreases its
epatotoxic effect, presumably by interfering with
s metabolism to toxic metabolites by the endoplas-
c reticulum. Similar morphologic lesions can also
 produced in phenobarbital-pretreated animals by
inute doses of CCl_4.

761 AUTOREGULATION OF GLYCOLYSIS, RESPIRATION,
GLUCONEOGENESIS AND GLYCOGEN SYNTHESIS IN
OLATED PARENCHYMAL RAT LIVER CELLS UNDER AEROBIC
D ANAEROBIC CONDITIONS. *(E.)* Seglen, P. O. (Nor-
gian Radium Hosp., Oslo). *Biochim. Biophys. Acta*
8(2):317-336, 1974.

renchymal cells isolated from the livers of male
star rats fasted for 16 hr have a comparatively
w ability to utilize glucose, although fructose
 utilized very effectively by these cells. Gluco-
ogenesis from lactate, pyruvate, or fructose is
t subject to end-product inhibition by glucose
 physiological concentrations (5-20 mM) in cells
om fasted rats. However, glucose has a stimula-
ry and probably direct effect on glycogen synthe-
s. Liver cells from rats starved for 40 hr have
rgely lost the ability to synthesize glycogen.
ycolysis from fructose is strongly inhibited by
e end-product lactate under aerobic conditions.
ctate, but not pyruvate, slightly inhibits glyco-
n synthesis from high concentrations of fructose,
ile quinolinate, which blocks gluconeogenesis from
ctate (but not from fructose), does not prevent
e lactate inhibition of glycogen synthesis. Un-
r anaerobic conditions, glycolysis from fructose
 strongly stimulated, whereas gluconeogenesis and
ycogen synthesis are blocked. The end-product
hibition of glycolysis by lactate also largely
isappears during anaerobiosis. The concept of a
eneralized Pasteur effect" is introduced to empha-
ize the multiplicity of oxygen effects on liver
rbohydrate metabolism.

762 INFLUENCE OF DIETARY BILE ACIDS ON FORMA-
TION OF BILE ACIDS IN RAT. *(E.)* Daniels-
n, H. (Karolinska Inst., Stockholm, Sweden).
teroids 22(5):667-675, 1973.

ale Sprague-Dawley rats received various taurine-
njugated bile acids at the 1%-level in the diet for
 or 7 days. The effect on several hydroxylations
nvolved in the biosynthesis and metabolism of bile
cids was studied. The 7α-hydroxylation of choles-
erol was inhibited by feeding taurocholic acid,
aurochenodeoxycholic acid and taurodeoxycholic acid
or 3 or 7 days. Taurohyodeoxycholic acid or
aurolithocholic acid caused no marked inhibition.
he 12α-hydroxylation of 7α-hydroxy-4-cholesten-3-
ne was inhibited after 3 or 7 days by all bile acids
xcept taurohyodeoxycholic acid. This acid caused a
arked stimulation of 12α-hydroxylation. The effects
f the different bile acids on the 7α-hydroxylation
f taurodeoxycholic acid were not great. Taurocholic
cid and taurodeoxycholic acid stimulated the 6β-
ydroxylation of lithocholic acid and taurochenodeoxy-
holic acid. The reaction was inhibited by tauro-
henodeoxycholic acid, at least after 7 days. Taurohyodeoxycholic acid inhibited the 6β-hydroxylation slightly. Taurolithocholic acid had no effect. The finding that taurohyodeoxycholic acid and taurolithocholic acid have no effect on cholesterol 7α-hydroxylase suggests that bile acids may have to fulfill certain structural requirements to be able to inhibit bile acid biosynthesis. The lack of effect of taurohyodeoxycholic acid on cholesterol 7α-hydroxylase and the stimulatory effect on 7α-hydroxy-4-cholesten-3-one 12α-hydroxylase appear to contradict earlier findings which indicate that feeding of hyodeoxycholic acid results in an overall stimulation of cholesterol excretion. The effects on 6β-hydroxylation of lithocholic acid and on 6β-hydroxylation of taurochenodeoxycholic acid were the same, indicating the same enzyme system catalyzes both reactions.

2763 THE CHOLERETIC EFFECT OF PURE NATURAL CHOLECYSTOKININ IN DOGS. *(E.)* Thulin, L. (Karolinska Inst., Stockholm, Sweden). *Acta Chir. Scand.* 139(7):635-640, 1973.

The hepatic bile flow was studied in 4 dogs with permanent bile fistulas which functioned during 5-21 weeks. The experiments were performed in animals which had fasted for 16-22 hr. After a 2 hr control period the bile flow was studied under various experimental conditions. In one group fasting was continued for another 6 hr (4 experiments in 2 dogs) and the bile flow remained at the control values. In a second group dogs received orally a standard meal of food alone (6 experiments in 3 dogs), the bile produced during the previous 24 hr (2 experiments in 1 dog), or food together with bile (5 experiments in 3 dogs). After food alone, the bile flow increased to 117-212%; after bile, to 580-740%; and after food with bile, to 405-675% of control values. In a third group dogs were given 2 hr infusions of pure natural cholecystokinin, (0.25-32 Ivy dog units/kg/hr, i.v.) for 40 experiments in 4 dogs. A dose-response curve in 3 dogs showed a threshold effect on the bile flow at 2-4 units/kg/hr and a maximum stimulation at 8 units/kg/hr. No further effect was observed at higher dosages. The average maximum bile flow in 4 dogs was approximately 250% of the control values. The cholecystokinin effect on the bile flow was quantitatively comparable to the effect of feeding with food alone, but lower than the effect of bile alone or food with bile.

2764 ACTIVATION OF HEPATIC MICROSOMAL GLUCURONYL TRANSFERASE BY BILIRUBIN. *(E.)* Sanchez, E.; Tephly, T. R. (Toxicol. Ctr., Univ. Iowa, Iowa City). *Life Sci.* 13(11):1483-1490, 1973.

In liver microsomal preparations from Sprague-Dawley rats, bilirubin, in concentrations of 0.1 to 2.0mM, markedly stimulated the glucuronidation of morphine and p-nitrophenol catalyzed by UDPglucuronyltransferase. The activation was not due to contamination of bilirubin with bile acids. At equimolar concentrations, the activating effect of bilirubin was greater than that produced by deoxycholate, a detergent well known as an activator of UDPglucuronyltransferase. Other results suggest that bilirubin activation of UDPglucuronyltransferase is similar to that produced by detergents. *In vivo* experiments showed that the rate of urinary excretion of morphine glucuronide in rats treated with bilirubin was twice that of control animals. These results indicate that, beyond a critical concentration of detergent, bilirubin can only inhibit UDPglucuronyltransferase activity toward p-nitrophenol. It is suggested that bilirubin may be a physiologic activator of UDPglucuronyltransferase activity.

2765 EFFECT OF CHRONIC ETHANOL TREATMENT ON TRYPTOPHAN OXYGENASE, TYROSINE AMINOTRANSFERASE AND GENERAL PROTEIN METABOLISM IN THE INTACT AND PERFUSED RAT LIVER.

(E.) Morland, J. (Dept. Pharmacol., Univ. Oslo, Norway). *Biochem. Pharmacol.* 23(1):21-35, 1974.

Male Wistar rats (275-300 g body wt) were given ethanol to provide 31 per cent of the total calories while sucrose replaced ethanol isocalorically in controls. Thirty-six per cent of the calories were provided by fat in both groups. Tryptophan oxygenase activity was reduced to about 60% of control activity in livers from rats treated with ethanol for 38 days. This effect was not a consequence of a reduction of *in vivo* corticosterone levels in the treated animals. Tyrosine aminotransferase activity was unchanged in these livers. When the livers were perfused with dexamethasone (20 μg/ml), the induction of both enzymes was significantly lower in ethanol-treated rats. The incorporation of labelled amino acids into protein 30 and 45 min after the addition of label was also reduced in livers from treated rats. The degradation of tryptophan oxygenase, tyrosine aminotransferase, and general proteins, measured in perfused liver after cycloheximide (50 μg/ml) was not significantly affected by previous ethanol consumption. No obvious leakage of liver proteins to the perfusate could be registered after ethanol treatment. Ethanol treatment did not significantly influence plasma bilirubin, liver bile production, liver lipids or gross histological appearance of the liver. It was concluded that liver tryptophan oxygenase, tyrosine aminotransferase and general protein synthesis was reduced as a consequence of the previous chronic intake of ethanol independent of changes in the other liver parameters measured.

2766 EFFECT OF ETHANOL ON LIVER TRIGLYCERIDE CONCENTRATION IN FED AND FASTED RATS.

(E.) Johnson, O. (Dept. Chem., Univ. Umea, Sweden). *Lipids* 9(1):57-60, 1974.

The effect of ethanol, given by gastric tube or by intraperitoneal injection, on the liver triglyceride concentration in fasted and *ad libitum* fed female Sprague-Dawley rats was investigated. Ethanol, independent of the route of administration, increased the liver triglyceride concentration in fasted rats during an 8 hr period but caused a much smaller increase in the *ad libitum* fed rats. The incorporation of intravenous injected ^{3}H-oleic acid into the liver triglycerides increased significantly after ethanol feeding in fasted but not in fed rats. Based upon this and the plasma free fatty acid concentrations, it is concluded that ethanol causes a marked increase in the utilization of plasma free fatty acids for synthesis of liver triglycerides in fasted but not in fed rats. It is suggested that this is part of the explanation for the different responses to ethanol of the liver triglyceride concentrations in fasted and fed rats.

2767 THE COMBINED EFFECT OF ETHANOL AND PHENOBARBITAL ON THE ACTIVITIES OF HEPATIC DRUG METABOLIZING ENZYMES IN RATS.

(E.) Luoma, P.; Vorme, M. (Univ. of Oulu, Finland). *Acta Pharmacol. Toxicol.* 33(5-6):442-448, 1973.

The effect of feeding ethanol (15% v/v) and/or phenobarbital (0.05% w/v) in drinking water on the rate of metabolism of methylaniline and *p*-nitrobenzoic acid, and on the microsomal protein and the cytochrome P-450 contents in the liver of male Sprague-Dawley rats was studied. Animals treated with ethanol for 3 days showed an increase in N-demethylation of methylaniline of 88%, whereas the nitroreduction of *p*-nitrobenzoic acid was inhibited by 47%. Ethanol and phenobarbital had a synergistic action on N-demethylation. Ethanol inhibited the induction of nitroreduction by phenobarbital. Ethanol, like phenobarbital, increased microsomal protein and they acted synergistically in this respect. Ethanol, like phenobarbital, caused a significantly greater increase in microsomal cytochrome P-450 than in microsomal protein content, and they also acted synergistically on cytochrome P-450. The effects of ethanol on the N-demethylase activity, cytochrome P-450 and microsomal protein are presumably associated with the increase in the smooth endoplasmic reticulum as also occurs with phenobarbital and other inducers. The rates of synthesis of individual proteins associated with the endoplasmic reticulum can vary independently, either increasing or decreasing, and this may explain the different actions of ethanol and phenobarbital on the enzyme activities studied.

2768 METABOLISM OF MONO- AND DIHYDROXYLATED BILE ACIDS IN PREPARATIONS OF HUMAN LIVER.

(E.) Bjorkhem, I.; Einarsson, K.; Hellers, G. (Karolinska Inst., Stockholm, Sweden). *Eur. J. Clin. Invest.* 3(6):459-465, 1973.

The metabolism of tritium-labelled taurodeoxycholic acid, taurochenodeoxycholic acid, taurolithocholic acid and of [24-^{14}C]lithocholic acid and [24-^{14}C]3-keto-5β-cholanoic acid was studied in fractions of human liver homogenates. In the presence of microsomal fraction fortified with an NADPH-generating system a small conversion of taurodeoxycholic acid into taurocholic acid occurred. No significant hydroxylation of taurochenodeoxycholic acid, taurolithocholic acid or free lithocholic acid could be detected. In the presence of microsomal fraction fortified with NAD lithocholic acid was converted into 3-keto-5β-cholanoic acid. In the presence of microsomal fraction fortified with NADH, 3-keto-5β-cholanoic acid was reduced to isolithocholic acid and lithocholic acid (ratio 3:1). In the presence of 100,000 x *g* supernatant fraction only lithocholic

id was formed from 3-keto-5β-cholanoic acid. The
patic conversion of lithocholic acid into isolitho-
olic acid may have some physiological significance
nce isolithocholic acid and lithocholic acid prob-
ly differ in their toxic properties. Thus, 3β-
droxy steroids are in general less hemolytic than
-hydroxy-steroids and it has been reported that
olithocholic acid is less pyrogenic than litho-
olic acid.

'69 STUDIES OF THE HEPATIC EXCRETORY DEFECTS
IN ESSENTIAL FATTY ACID DEFICIENCY: THEIR
SSIBLE RELATIONSHIP TO THE GENESIS OF CHOLESTEROL
LLSTONES. *(E.)* Sarfeh, I. J.; Beeler, D. A.;
eble, D. H.; Balint, J. A. (Albany Med. Col. Union
iv., N.Y.). *J. Clin. Invest.* 53(2):423-430, 1974.

le hamsters were fed normal and essential fatty
id deficient diets for at least 12 weeks before
le duct cannulation. With [^{32}P]phosphate, hepa-
c synthesis of lecithin was similar, but biliary
cretion of newly synthesized lecithin was signifi-
ntly reduced in essential fatty acid-deficient ham-
ters compared to that in normal hamsters. Hepatic up-
ke of intravenously infused taurocholate and tauro-
enodeoxycholate were similar in both groups of ani-
als. However, biliary excretion of intravenously in-
sed taurocholate was significantly reduced in essen-
ial fatty acid-deficient hamsters, whereas that of
urochenodeoxycholate was unchanged. The absolute
te of biliary cholesterol excretion was similar in
th groups. Canalicular bile flow, as measured by
^{14}C]erythritol clearance after functional nephrec-
my, was significantly lower, with both the bile
lt-dependent and independent fractions of this
ow being diminished in essential fatty acid-defi-
ent hamsters infused with taurocholate. It is
ncluded that essential fatty acid deficiency leads
impaired biliary excretion of taurocholate, leci-
in, and water, while cholesterol transport is un-
fected, and thus results in supersaturation of bile
th respect to cholesterol and production of litho-
nic bile.

70 THE EFFECT OF SIMULATED METABOLIC ACIDOSIS
ON INTRACELLULAR pH AND LACTATE METABOLISM
THE ISOLATED PERFUSED RAT LIVER. *(E.)* Lloyd, M.
; Iles, R. A.; Simpson, B. R.; Strunin, J. M.;
ayton, J. M.; Cohen, R. D. (London Hosp. Med. Coll.,
ngland). *Clin. Sci. Mol. Med.* 45(4):543-549, 1973.

e effect of changes in extracellular pH (pH_e) and
tracellular pH (pH_i) on lactate uptake was studied
the isolated liver of Wistar rats. The mean lac-
ate concentrations in the perfusate at the time of
H_i measurement were 2.13, 2.02, 2.19, 2.36, and
.98 mmol/l for the experiments in which pH_i lay
ithin the ranges 7.4-7.2, 7.2-7.1, 7.1-7.0, 7.0-6.9,
nd 6.9-6.8, respectively. None of these mean
alues differed significantly from each other. As
H_e decreased from 7.4 to 6.85, mean pH_i fell rela-
ively little. Further lowering of pH_e from 6.85
o 6.7 resulted in almost as great a fall of mean
H_i. Mean lactate uptake was between 0.9 and 2
mol min^{-1} 100 g rat^{-1} when pH_e lay between 7.4 and
.1. Lower values of pH_e were associated with progressively lower lactate uptakes and when pH_e fell below 7.1-7.0, mean lactate uptake was negative, although the mean value of the lactate outputs for the 2 groups of perfusions with the 2 lowest pH_e levels were not significantly less than zero when combined. Mean lactate uptake did not vary appreciably over the pH_i range 7.4-7.0. At lower levels of pH_i an abrupt change over from uptake to output of lactate occurred. The results show that there is little effect on lactate uptake as pH_i is decreased to 7.1; thereafter a rapid fall in lactate uptake occurs and pH_i values below 7.0, lactate output occurs. The relationship between pH_e and lactate uptake is somewhat similar to that between pH_i and lactate uptake. The effect of metabolic acidosis in converting hepatic lactate uptake to output could be relevant to clinical lactic acidosis, whether due to poor tissue perfusion or to other mechanisms. It is possible that the success of therapeutic measures in either type of lactic acidosis may be dependent on raising hepatic intracellular pH.

2771 BIOCHEMICAL ASPECTS OF EXPERIMENTAL HEPATIC ALLOTRANSPLANTATION. *(E.)* Halliday, J. P.; Sheil, A. G. R.; Hensley, W. J.; Bookallil, M. J.; Wotherspoon, G. P. (Dept. Surg., Univ. Sydney, Australia). *Arch. Surg.* 108(1):75-80, 1974.

Hepatic allografts were performed in 14 pigs using techniques designed to minimize damage to the allograft. Ten of these transplants were successful, with failure in the remaining 4 cases being due to technical problems. All allografts undergoing successful revascularization secreted bile freely and hemorrhagic diathesis did not occur. All survivors recovered vigorously; in none was the serum bilirubin level elevated in the early postoperative period, nor were serum glucose levels difficult to maintain. In all surviving animals, the serum enzyme levels returned to normal early in the first postoperative week. With regard to the donor livers, hepatocellular damage reflected by elevated SGOT levels became evident during perfusion and developed slowly after revascularization. Similar changes in lactic dehydrogenase were not found. Potassium efflux during cold perfusion appeared to be related to reversible changes in membrane potential and enzyme activity induced by hypothermia, not to damage. Interference with the hepatic synthesis of plasma proteins and cholesterol was observed. The depression in cholesterol synthesis was shorter lived than the depression in plasma protein synthesis.

2772 NUTRITIONAL REGULATION OF LIPID METABOLISM IN RATS. IV. METABOLISM OF HEPATIC GLYCEROLIPIDS IN FASTED RATS *IN VIVO* AND *IN VITRO*. *(E.)* Imaizumi, K.; Yamamoto, M.; Sugano, M. (Fac. Agric., Kyushu Univ., Japan). *J. Nutr. Sci. Vitaminol.* 19(5):419-431, 1973.

^{14}C-palmitate and linoleate were injected i.p. into male Wistar rats which had been fasted for 15 hr; their incorporation into hepatic glycerolipids 0.5 and 6 hr after their injection was markedly depressed. There was no significant reduction in the incorporation of ^{14}C-stearate. The fractional disappearance rate of ^{14}C-linoleate from phosphatidylcholine (PC) and phosphatidylethanolamine was increased in the fasted rats, as was the disappearance rate of ^{14}C-palmitate and stearate into molecorporation of C-palmitate and stearate into molecular PC was specifically altered. Desaturation of these precursors in the liver was depressed by fasting, as was the synthesis of the acyl moieties from acetate. When ^{14}C-acetate was injected i.p. at the beginning of fasting, the turnover of the labeled fatty acids in the liver between 3 and 6 hr postinjection was slower in the fasted rats, the turnover of the polyunsaturated acids being the slowest. The results indicate that the specific changes in the turnover of individual fatty acids in the hepatic glycerolipids are principal determinants of the fasting-induced changes in the fatty acid composition.

2773 A MECHANISM OF THE ACCELERATION OF LIPID PEROXIDE FORMATION IN LIVER HOMOGENATES AND SUBCELLULAR FRACTIONS OF VITAMIN E-DEFICIENT MICE. *(E.)* Fukuzawa, K.; Uchiyama, M. (Fac. Pharm., Univ. Tokushima, Japan). *J. Nutr. Sci. Vitaminol.* 19(5):433-453, 1973.

Male ddY mice were maintained on normal or vitamin E deficient diets, after which tissue homogenates were prepared from their livers. The concentration of tocopherol was significantly reduced in the livers of the E-deficient animals. There were no significant differences in the hepatic phospholipid contents of the two groups, while in the vitamin E-deficient group the oleic acid level was elevated and the linoleic acid was decreased. The free fatty acid levels were increased in the livers of the vitamin E-deficient mice, although these free fatty acids did not appear to accelerate lipid peroxidation. Lipid peroxidation was unchanged in the presence of Triton X-100 and accelerated in the presence of deoxycholate, Tween 60, and Tween 80. Lipid peroxidation in both normal and vitamin E-deficient liver was promoted with increasing homogenate concentrations. The rate of peroxidation was unaffected by reduced nicotinamide adenine dinucleotide phosphate, increased by reduced nicotinamide adenine dinucleotide phosphate, and inhibited by glutathione; the effects did not differ between the normal and vitamin E-deficient livers. Ascorbate had little effect on lipid peroxidation in the normal or vitamin E-deficient homogenates, but it greatly increased Tween 80 induced peroxidation. Both aminopyrine oxidation and lipid peroxidation were increased in liver homogenates from normal mice pretreated with phenobarbital. In the vitamin E-deficient homogenates, lipid peroxidation was increased and aminopyrine oxidation was decreased by phenobarbital pretreatment. The data suggest that vitamin E exerts its antioxidant effect by preserving the normal structure of the membrane.

2774 GIANT MITOCHONDRIA. II. INDUCTION OF MATRIX ENRICHED MEGAMITOCHONDRIA IN MOUSE LIVER PARENCHYMAL CELLS BY ETHIDIUM BROMIDE. *(E.)* Albring, M.; Radsak, K.; Thoenes, W. (Inst. Cytobiol. Cytopathol., Univ. Marburg, Germany). *Virchows Arch.* [*Zellpathol.*] 14(4):373-377, 1973.

The effects of ethidium bromide on mitochondrial ulstrastructure were studied in livers from weanling male NMRI mice. Each mouse received a single i.p. injection of ethidium bromide (dissolved in saline, 50 μg/g body weight). After 5 days, a randomly chosen number of animals was sacrificed and specimens of liver removed for electron microscopy. All hepatocytes selected from peripheral or intermediate areas of the liver contained distinctly enlarged mitochondria sometimes encroaching the cell nucleus in diameter. In addition, organelles of normal as well as intermediate size could be observed in every cell examined. Mitochondrial enlargement was, however, less pronounced in central parts of the lobule showing only a moderate degree of mitochondrial structural alteration. Giant mitochondria were characterized by a vastly augmented matrix, which was constant in electron density, regardless of the size of the single mitochondrion. It is concluded that the induction of megamitochondria by ethidium bromide supports the concept of mitochondrial fusion as the originally underlying process.

2775 INFLUENCE OF ALBUMIN ON THE HEPATIC UPTAKE OF UNCONJUGATED BILIRUBIN. *(E.)* Bloomer, J. R.; Berk, P. D.; Vergalla, J.; Berlin, N. I. (Natl. Cancer Inst., Bethesda, Md.). *Clin. Sci. Mol. Med.* 45(4):505-516, 1973.

The influence of albumin on the hepatic uptake of unconjugated bilirubin was studied. The initial distribution volumes of [^{3}H]bilirubin in 6 adult subjects were equivalent to those of ^{131}I-labelled albumin following simultaneous intravenous injection of both compounds. However, the initial rate of loss of [^{3}H]bilirubin from plasma was 7 to 30 times faster than that of ^{131}I-labelled albumin. *In vitro* uptake of [^{3}H]bilirubin by Gunn rat liver slices occurred at a rate 3 times faster than could be accounted for by movement linked with albumin. There was no *in vitro* transfer of [^{14}C]bilirubin from albumin to the organic anion-binding proteins of rat liver cytosol. Instead, albumin was shown to strip [^{14}C]bilirubin from these proteins. When albumin, to which [^{14}C]bilirubin had been bound, was precipitated with anti-albumin antibody, [^{14}C]bilirubin was recovered completely in the supernatant, indicating that unconjugated bilirubin may be readily separated from albumin if albumin interacts with another macromolecule. These results indicated that unconjugated bilirubin is separated from albumin prior to its uptake by the hepatic cell, rather than the entire albumin-bilirubin complex entering the hepatocyte. The data suggest that the uptake mechanism probably requires the participation of the plasma membrane.

2776 SYNTHESIS OF ESSENTIAL AMINO ACIDS FROM THEIR α-KETO ANALOGUES BY PERFUSED RAT LIVER AND MUSCLE. *(E.)* Walser, M.; Lund, P.; Ruderman, N. B.; Coulter, A. W. (Nuffield Dept. Med., Oxford Univ., England). *J. Clin. Invest.* 52(11):2865-2877, 1973.

Isolated rat liver and hindquarter (muscle) preparations from female Wistar rats were perfused with keto-analogues of valine, leucine, isoleucine, meth-

onine, or phenylalanine to determine the fate of
ese α-keto-analogues in tissues of normal animals.
en perfused at 1.5-2.0 mM, all 5 compounds were
ilized rapidly by the liver of 48-hr starved rats,
: rates varying from 49 to 155 μmol/hr/200 g rat.
e corresponding amino acids appeared in the medium
i significantly increased concentrations. Perfusion
th phenylpyruvate also led to the appearance of
rosine. Urea release was unaltered. Measurement
f metabolite concentrations particularly at keto-
cid concentrations of 5 mM or above in freeze-
lamped liver revealed a large increase in α-
etoglutarate, and a moderate to marked decrease in
issue glutamine. This decrease was quantitatively
ufficient to account for nitrogen appearing in newly
ynthesized amino acids. Isolated hindquarters of
ed rats were perfused with the same ketoacids at
oncentrations of 1.3-8.0 mM. All were utilized at
ates varying from 1.4 to 7.0 μmol/hr/g muscle per-
used. The correspondong amino acids were released
: greatly increased rates. Alanine and glutamate
evels fell in some perfusions, but the principal
itrogen donor in muscle was not identified; the
ontent of glutamine in tissue, and its rate of re-
ease into the perfusate remained constant. It is
uggested that diseases characterized by abnormal
ccumulations of the ketoacids studied here may also
xhibit some of the secondary metabolic disturbances
bserved in the perfused liver.

777 EFFECT OF TRANSIENT BILIARY OBSTRUCTION ON LIVER FUNCTION AND MORPHOLOGY. *(E.)* So,
. U.; Bondar, G. F. (Surg.-Med. Res. Inst., Univ.
lberta, Edmonton, Canada). *Can. J. Surg.* 17(1):
9-58, 1974.

artial biliary obstruction was produced in 80 guinea
igs by partial ligation of the distal common bile
uct and maintained from 4 to 8 weeks. Partial
iliary obstruction up to 8 weeks produced marked
epatic changes. The significant functional changes
ere elevations of the serum alkaline phosphatase
nd SGOT levels (37.2 Babson U and 44.7 TransAc U,
esp., at 8 weeks) and decrease of the serum albumin
evels (0.83 g/100 ml). Morphologically, the promi-
ent changes were round cell infiltration, fibrosis,
nd bile duct proliferation with dilatation in the
ortal and interlobular areas, parenchymal cell
trophy and focal necrosis. Peak elevations of in-
raductal pressure after 4 and 8 weeks were noted at
imes when significant morphological changes occurred
n the liver. Surgical relief of obstruction resul-
ed in rapid recovery of liver function and restor-
tion of normal morphology after 8- and 20-week peri-
ds. Therefore, partial biliary obstruction of up
o 8 weeks is reversible in the guinea pig.

778 ORTHOPHOSPHATE CONVERSION IN CCl_4-DAMAGED LIVER. *(Ger.)* Fleischer, I.;
runder, H.; Till, U.; Zschache, I. (Inst. Physiol.
hem., Friedrich Schiller Univ., Jena, Germany).
cta Biol. Med. Ger. 31(5):633-640, 1973.

779 RAT LIVER GLUCOKINASE ACTIVITY STUDIED IN LIVER PERFUSION SYSTEM. *(E.)* Hoddevik, G.; Spydevold, O. (Inst. Med. Biochem., Univ. Oslo, Norway). *Acta Physiol. Scand.* 90(1):41-51, 1974.

2780 FLOATING OF ENZYME ACTIVITIES, FREE FATTY ACIDS, P-FREE LIPIDS, AND PHOSPHOLIPIDS IN SERUM IN CHRONIC LIVER INJURY INDUCED BY CCl_4 AND THE EFFECT OF ESSENTIAL PHOSPHOLIPIDS. *(Ger.)* Rauen, H. M.; Schriewer, H.; Rahmede, D.; Riese, B.; Ruther, N.; The, L. G.; Gebauer, B.; Abu Tair, M. (Inst. Physiol. Chem., Westphalian Wilhelms Univ., Munster, Germany). *Arzneim. Forsch.* 24(3):295-303, 1974.

2781 EFFECT OF PHENOBARBITAL OR PREGNENOLONE-16α-CARBONITRILE (PCN) PRETREATMENT ON ACUTE CARBON TETRACHLORIDE HEPATOTOXICITY IN RATS. *(E.)* Tuchweber, B.; Werringloer, J.; Kourounakis, P. (Inst. Med. Exp. Surg., Univ. Montreal, Canada). *Biochem. Pharmacol.* 23(3):513-518, 1974.

2782 EFFECTS OF 2,3,7,8-TETRACHLORODIBENZO-p-DIOXIN ON STIMULATED RNA SYNTHESIS IN THE LIVER AND KIDNEY OF THE RAT. *(E.)* Greig, J. B.; Taylor, D. M.; Jones, J. D. (Med. Res. Council Labs., Carshalton, England). *Chem. Biol. Interact.* 8(1):31-39, 1974.

2783 THE SEQUENTIAL INACTIVATION OF GLYCOGEN PHOSPHORYLASE AND ACTIVATION OF GLYCOGEN SYNTHETASE IN LIVER AFTER THE ADMINISTRATION OF GLUCOSE TO MICE AND RATS. THE MECHANISM OF THE HEPATIC THRESHOLD TO GLUCOSE. *(E.)* Stalmans, W.; De Wulf, H.; Hue, L.; Hers, H. G. (Lab. Physiol. Chem., Catholic Univ. Louvain, Belgium). *Eur. J. Biochem.* 41(1):127-134, 1974.

2784 INHIBITION OF RAT-LIVER RNA POLYMERASE IN VITRO BY AFLATOXIN B_1 IN THE PRESENCE OF A MICROSOMAL FRACTION. *(E.)* Akinrimisi, E. O.; Benecke, B. J.; Seifart, K. H. (Univ. Lagos Coll. Med. Nigeria). *Eur. J. Biochem.* 42(2):333-339, 1974.

2785 POLYAMINE EFFECTS ON ^{14}C-LEUCINE TRANSFER TO MICROSOMAL PROTEIN IN A RAT LIVER CELL FREE SYSTEM DURING AGING. *(E.)* Comolli, R. (Inst. Gen. Pathol., Univ. Milan, Italy). *Exp. Gerontol.* 8(6):307-313, 1973.

2786 DIETARY AND CORTISONE REGULATION OF CYTOSOL SERINE AND PHOSPHOSERINE AMINOTRANSFERASES IN RAT LIVER. *(E.)* Hoshino, J.; Simon, D.; Robert, B.; Kroger, H. (Robert Koch Inst., Berlin, Germany). *Hoppe Seylers Z. Physiol. Chem.* 335(1):4-10, 1974.

2787 EFFECT OF BARBITURATES ON THE LIVER OF RATS EXPOSED TO CARBON DISULPHIDE VAPOUR. *(E.)* Freundt, K. J.; Liebaldt, G. P.; Sieber,

K. H. M. (Clin. Mental Neurol. Dis., Univ Wurzburg, Germany). *Int. Arch. Arbeitsmed.* 32(4):297-303, 1974.

2788 NUCLEIC ACID AND POLYAMINE SYNTHESIS IN THE RAT DURING SHORT-TERM PROTEIN DEFICIENCY: RESPONSIVENESS OF THE LIVER TO PARTIAL HEPATECTOMY. *(E.)* Siimes, M. A.; Dallman, P. R. (Dept. Pediatr., Univ. California, San Francisco). *J. Nutr.* 104(1):47-58, 1974.

2789 NUCLEIC ACID AND POLYAMINE SYNTHESIS IN THE RAT DURING SHORT-TERM PROTEIN DEFICIENCY: RESPONSIVENESS OF THE BONE MARROW AND LIVER TO BLOOD LOSS. *(E.)* Siimes, M. A.; Dallman, P. R. (Dept. Pediatr., Univ. California, San Francisco). *J. Nutr.* 104(1):59-64, 1974.

2790 QUANTITATION OF PHOSPHATIDYL N-METHYL AND N,N-DIMETHYL AMINO-ETHANOL IN LIVER AND LUNG OF N-METHYLAMINOETHANOL FED RATS. *(E.)* Katyal, S. L.; Lombardi, B. (Sch. Med., Univ. Pittsburgh, Pa.). *Lipids* 9(2):81-85, 1974.

2791 EFFECTS OF MAGNESIUM DEFICIENCY ON SERUM PROTEINS AND HEPATIC FREE AMINO ACID PATTERN. *(E.)* Lizarralde, G.; Jones, J. E.; Shane, S. R.; Flink, E. B. (West Virginia Univ., Morgantown). *Res. Commun. Chem. Pathol. Pharmacol.* 7(2):433-441, 1974.

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See also 2563, 2569, 2584, 2591, 2596, 2673, 2730, 2864, 2898, 2900, 2910, 3166, 3223, 3267, 3268, 3279.

SECRETION AND METABOLISM

Intestine

56 THE EFFECT OF INDOMETHACIN ON THE RELEASE OF PROSTAGLANDIN E_2 AND ACETYLCHOLINE OM GUINEA-PIG ISOLATED ILEUM AT REST AND DURING ELD STIMULATION. *(E.)* Botting, J. H.; Salzmann, (Dept. Pharmacol. Univ. London, England). *. J. Pharmacol.* 50(1):119-124, 1974.

inea-pig ileum suspended in Krebs solution showed continuous increase of tone which was lost by anging the bath fluid. Prostaglandin E_2 was re- ased from the ileum during incubation, and its con- ntration in the bath fluid appeared to correlate th the increase in tone. Supramaximal field sti- lation (10 Hz) resulted in increased release prostaglandin E_2 from the ileum. At lower rates stimulation, the increase in the release of E_2 compared with the resting output was not significant. Indomethacin (1 and 10 μg/ml) produced a significant, dose-related reduction of the amount of prostaglandin E measured in the bath fluid at rest and with field stimulation. Indomethacin inhibited the contraction of the ileum during incubation in Krebs solution. Indomethacin (10 and 20 μg/ml) had no significant effect on the release of acetylcholine during field stimulation, but reduced the resting output of acetylcholine from guinea-pig ileum in some experiments. Prostaglandins are assumed to be physiological modulators in the release of transmitter in the adrenergic nervous system, and a similar feed-back mechanism has been suggested for the parasympathetic nervous system. If this type of feed-back mechanism actually existed in the parasympathetic nervous system, inhibition of prostaglandin synthesis by indomethacin should have increased acetylcholine release in the guinea-pig isolated ileum. Thus no evidence was obtained of a prostaglandin-mediated negative feedback mechanism affecting acetylcholine release.

2857 SMALL INTESTINAL PHLORIZIN HYDROLASE: THE "β-GLYCOSIDASE COMPLEX." *(E.)*

Colombo, V.; Lorenz-Meyer, H.; Semenza, G. (Dept. Biochem. Swiss Inst. Technol., Zurich). *Biochim. Biophys. Acta* 327(2):412-424, 1973.

The age dependence and association with neutral lactase of phlorizin hydrolase activity were studied. Phlorizin hydrolase activity in rat small intestine is highest at birth and decreases at the time of weaning, reaching the low adult level at about 20 days of age. This age dependence is very similar to that of small intestinal lactase, and is quite different from that of the small intestinal β-glucosidases (maltase, sucrase, isomaltase, and trehalase) which are essentially absent at birth and begin to develop between 15 and 16 days of life. The similar age dependence of lactase and phlorizin hydrolase, together with a strong correlation between these 2 activities in a random sample of human peroral biopsies and the absence of phlorizin hydrolase activity in the small intestine of patients affected by lactase deficiency indicate that phlorizin hydrolase and lactase activities are either due to the same catalytic site, or, if due to more than one enzyme, that they are subjected to similar or related biological control mechanisms. Neutral (brush-border bound) lactase was isolated from the small intestine of baby rats. The lactase/phlorizin hydrolase ratio remains essentially constant during those fractionation steps which bring about an almost 70-fold purification. The different time-course of heat inactivation of the 2 glycosidase activity in essentially pure rat intestinal lactase, in partially purified hamster intestinal lactase, and in total homogenate of human small intestine shows that in these species the 2 glycosides are not split by a single common catalytic site. Lactase and phlorizin hydrolase activities are due to the same protein or protein complex (referred to as the "β-glycosidases complex"); however, they are due to at least 2 independent or partially independent catalytic sites. The hydrolysis of a number of hetero-β-glycosides was examined by a partially purified preparation of hamster lactase-phlorizin hydrolase, before and after partial heat denaturation. Meta and p-nitro-phenyl-β-glucosidase activities survive the treatment essentially to the same extent as phlorizin hydrolase activity, making them suitable substrates for a further study. The β-glucosides compete mutually for the same catalytic site and the contribution of the lactase moiety for m-nitrophenyl-β-glucosidase activity must be minimal or zero. Phlorizin inhibits sugar uptake (uptake of 6-deoxy-D glucose) in the small intestine of baby rats more than in adult rats.

2858 ACTIVE ELECTROLYTE SECRETION STIMULATED BY CHOLERAGEN IN RABBIT ILEUM *IN VITRO.*

(E.) Powell, D. W.; Binder, H. J.; Curran, P. F. (Yale Univ. Sch. of Med., New Haven, Conn.). *Am. J. Physiol.* 225(4):781-787, 1973.

Purified cholera toxin added to the mucosal solution of New Zealand rabbit ileum *in vitro* caused changes in ion fluxes and electrical properties after a 50- to 60-min lag period. Potential difference and short-circuit current increased and tissue conductance decreased. In Ringer solution containing HCO_3, the toxin caused net secretion of both Na and Cl. In HCO_3-free solution, the toxin reduced net Na transport to zero and caused Cl secretion. No effects of toxin were observed on Na fluxes in HCO_3-Cl-free solution or on Cl fluxes in Na-free solution. The changes in net electrolyte fluxes are most easily explained by postulating that cholera toxin stimulates an electrically neutral process that transports NaCl and/or $NaCHO_3$ from serosa to mucosa.

2859 SYNTHESIS OF INTESTINAL GLYCOPROTEINS. INHIBITIONS OF 1-^{14}C GLUCOSAMINE INCORPORATION BY PHENYLBUTAZONE IN VIVO. *(E.)*

Lukie, B. E.; Forstner, G. G. (Dept. Med., Univ. Saskatchewan, Saskatoon, Canada). *Biochim. Biophys. Acta* 338(2): 345-351, 1974.

Phenylbutazone (5 mM) in the presence of sodium taurocholate (10 mM) inhibited incorporation of [1-^{14}C]glucosamine and [^{14}C]leucine into acid-precipitable protein by rat intestinal slices. Inhibition of [1-^{14}C]glucosamine incorporation was independent of medium glucosamine concentration. Phenylbutazone inhibited [1-^{14}C]glucosamine incorporation by cycloheximide-treated slices. Reduced [1-^{14}C]glucosamine incorporation did not result solely from inhibition of protein synthesis; a specific inhibition of oligosacharide assembly was demonstrated. Analysis of mucosal acid-soluble intermediate labeling revealed an increase in glucosamine and a reduction in all hexosamine intermediates following phenylbutazone. The major block of glucosamine incorporation produced by this agent occurred at the N-acetylation step. These effects closely parallel previous experience with sodium salicylate and may represent a common basis for their adverse gastrointestinal effects.

2860 THE ACTIONS OF PROSTAGLANDINS E_2 AND $F_{2\alpha}$ ON HUMAN FOETAL INTESTINE. *(E.)*

Hart, S. L. (Makerere Univ. Med. Sch., Kampala, Uganda). *Br. J. Pharmacol.* 50(1):159-160, 1974.

The response of human fetal intestinal tissue to prostaglandins E_2 and $F_{2\alpha}$ was investigated. Tissue was taken from the duodenum, ileum, distal ileum, ascending, transverse, or descending colon, and was allowed to equilibrate for 2 hr before the administration of drugs. Each tissue was shown to be capable of responding to acetylcholine and to noradrenaline before the actions of the prostaglandins were studied. There were 25 tissues from 8 fetuses, of gestational age 14-26 weeks. that responded to acetylcholine (5-130 ng/ml) and noradrenaline (0.5-10 μg/ml). Two preparations of duodenum, 10 of ileum, and 4 of distal ileum were studied and, on 8 of these, responses to noradrenaline were ob-

ned only in the presence of acetylcholine. An
um preparation from an 18-week fetus, which re-
ed in the presence of noradrenaline alone, gave
iphasic response, consisting of a small relaxa-
n and a much larger contraction, to both pro-
glandin E_2 and $F_{2\alpha}$. All other tissues from
small intestine contracted in the presence of
prostaglandins. The threshold dose of pro-
glandin E was usually 0.1 μg/ml but one ileum
paration, from a 22-week fetus, responded to a
centration of 4 ng/ml. Of 9 tissues from the
ge intestine, only an ascending colon preparation
axed in the presence of noradrenaline alone. Each
sue from the large intestine contracted in the
sence of prostaglandin E but the large intestine
less sensitive than the small intestine. The
ge intestine was also less sensitive to acetyl-
line. The contraction to either prostaglandin
or $F_{2\alpha}$ was unaltered in the presence of a con-
tration of hyoscine (0.6 ng/ml), which produced
e than 50% inhibition of the acetylcholine con-
action. The responses of the small and large in-
stine to both prostaglandin E_2 and $F_{2\alpha}$ were ant-
nized by polyphloretin phosphate at (80-160
/ml). The youngest tissue in this study was from
14-week old fetus and the response of this tissue
prostaglandins demonstrated that prostaglandin
ceptors, as well as muscarinic receptors and
renoceptors, are present at an early stage of
tal development.

61 THE PHOSPHOLIPASE A_2 ACTIVITY OF HUMAN SMALL INTESTINAL CONTENTS. *(E.)* Ihse, I.;
nesjo, B. (Univ. Hosp. Lund, Sweden). *Acta Chem.*
and. 27(8):2749-2756, 1973.

e properties, substrate requirements, kinetics,
d the behavior of small intestinal phospholipase
were studied during gel chromatography. The
ospholipase A_2 activity of small intestinal aspir-
es stored for 3 to 4 weeks at room temperature
s completely stable. Thus the enzyme is protected
ainst proteolytic inactivation in the intestinal
men. Previously filtered intestinal contents were
romatographed on Sephadex G 100 equilibrated and
uted with 0.15 mol/liter NaCl. Phospholipase A
d lipase appeared in the void volume as previously
served for lipase. Trypsin was eluted at a K_{av}
rresponding to its molecular weight. Accordingly
th phospholipase A and lipase have a tendency to
pear in fractions which under such circumstances
ntain the intestinal emulsion phase. Therefore,
e protection of intestinal phospholipase A against
yptic inactivation is independent of phase separa-
on. Intestinal contents centrifuged at 55,000
v for 1 hr exhibited exactly the same phospho-
pase A activity as before centrifugation. An
crease of 22% of the volume under optimal condi-
ons did not change the accuracy of the measure-
nts. After storage, a progressive decrease of the
from 5 was found. No shift in the optimal pH was
monstrated when using different concentrations of
le salt. With the addition of an excess of edetic
id, no phospholipase A activity was found even
th high concentrations of intestinal contents.
increase of the calcium concentration above the
letic acid concentration increased the enzymic activity until an optimum level was reached at a final concentration above 3 mmol/liter $CaCl_2$. In the absence of bile salt, phospholipase A of small intestinal contents was inactive. In the presence of 4.5 mmol/liter $CaCl_2$ and 12.5 mmol/liter sodium taurodeoxycholate and at 60 C, optimal phospholipase A activity of small intestinal contents was obtained at 8 mg lecithin/ml. Higher concentrations of lecithin inhibited the reaction. The enzymic activity increased in an almost linear fashion with increasing temperature of 60 C above which a decreased activity was found.

2862 LOCALIZATION OF FREE AND BOUND SECRETORY COMPONENT IN HUMAN INTESTINAL EPITHELIAL CELLS: A MODEL FOR THE ASSEMBLY OF SECRETORY IgA. *(E.)* Poger, M. E.; Lamm, M. E. (New York Univ. Sch. of Med., N.Y.). *J. Exp. Med.* 139(3):629-642, 1974.

The cytological and histological distribution of free and bound secretory component in human tissues was studied with fluorescent antibodies. Anti-free secretory component stained the cytoplasm of mucosal columnar cells (both crypts and villi) of the small intestine most prominently in the supranuclear Golgi zone. Both anti-α and anti-bound secretory component prominently stained the luminal border of columnar cells in mucosal crypts; no staining of villous epithelial cells was seen. The staining for bound secretory component and α-chains, which sometimes showed linear, radially oriented striations, was identical and had a variable depth measuring from 3-5 μm. The interepithelial cell spaces, which could be identified above the nucleus, consistently did not stain for free or bound secretory component, or α-chains. α-Chains, without secretory component, were prominent in many lamina propria plasma cells, both in villous cores and about crypts. All specimens of colon showed identical staining. Free secretory component was found predominantly in the supranuclear Golgi zone of columnar crypt cells, similar to its location in the small bowel. Secretory IgA, identified by the simultaneous presence of bound secretory component and α-chains, was seen throughout the apical half of the columnar crypt cell cytoplasm in a granular distribution which was most dense at the luminal surface and decreased in density deeper into the cytoplasm. In the gallbladder mucosa, free secretory component was present in the cytoplasm of the columnar surface epithelial cells in a finely granular pattern. Secretory IgA could not be identified. The serous cells of the bronchial and salivary glands consistently stained for secretory component whereas the mucous cells were uniformaly negative. It is concluded that the results favor a model in which secretory IgA is assembled inside epithelial cells from secretory component, which was synthesized in the same cell, and IgA, which enetered the epithelial cell after synthesis in and secretion by a plasma cell.

2863 GLUCOSE METABOLISM IN JEJUNAL MUCOSA OF FED, FASTED, AND STREPTOZOTOCIN-DIABETIC RATS. *(E.)* Anderson, J. W. (VA Hosp., Lexington, Ky.). *Am. J. Physiol.* 226(1):226-229, 1974.

Glycolytic and gluconeogenic enzyme activities and glycolytic rates were measured in the jejunal mucosa of Sprague-Dawley rats. Tissue homogenates have high rates of glycolysis, which may contribute significantly to the energy requirements of jejunal mucosa. In addition, jejunal mucosa has significant activities for several rate-limiting enzymes of gluconeogenesis with the activities of phosphoenolpyruvate carboxykinase, fructose diphosphatase, and glucose-6-phosphatase ranging from 12 to 21% of hepatic activities for these enzymes. Diabetes, induced by streptozotocin (50 or 75 mg/kg i.v.), was associated with significant increase in hexokinase and glucose-6-phosphate dehydrogenase activities in jejunal mucosa; glucose utilization and lactate production/g wet weight were also significantly increased. These increases in glycoltic rates may provide some of the energy required for the increased intestinal transport of carbohydrates and amino acids in diabetic animals. Fasting produced significant decreases in glycolytic enzyme activities and glycolytic rates, whereas the activities of 3 key gluconeogenic enzymes were significantly increased in jejunal mucosa. These observations suggest that fasting increases gluconeogenic rates in jejunal mucosa, whereas diabetes, which did not alter the activities of these 3 gluconeogenic enzymes, does not increase them.

2864 THE FATE OF LABELLED BILE SALTS INTRODUCED INTO THE COLON. *(E.)*

Morris, J. S.; Heaton, K. W. (Bristol Roy. Infirm., England). *Scand. J. Gastroenterol.* 9(1):33-39, 1974.

In 9 subjects undergoing T-tube drainage of bile, radioactive bile salts introduced into the colon were recovered from the bile mainly within the first 24 hr. Unconjugated cholate and deoxycholate were absorbed more efficiently than a conjugated bile salt taurocholate. Cholate and taurocholate were recovered largely in dehydroxylated form as conjugates of deoxycholate. These findings confirm that the human colon plays 2 roles in bile salt metabolism: bacterial dehydroxylation and absorption.

2865 BIOCHEMICAL AND PHARMACOLOGICAL EFFECTS OF LOCALIZED IRRADIATION OF THE INTESTINE. *(Fr.)*

Santini, R.; Brard, E.; Killian, J. (I.N.S.A., Villeurbanne, France). *C. R. Soc. Biol.* 167(8/9): 1129-1135, 1973.

The effect of local irradiation (800 r) of the intestine was studied on the monoamine oxidase activity in the terminal ileum of the guinea pig and on the contents of acetylcholine and cholinesterase in the duodenum and serotonin in the ileum of the rat. In the irradiated intestine and segments above and below it, acetylcholine contents decreased within the first 24 hr after irradiation and then increased to levels significantly higher than the original ones on the second day. This was followed by a more pronounced drop than the first one on day 4. On day 14 the acetylcholine content was 100% above the original value above the irradiated intestine and was 30% higher below the irradiated segment. Values gradually returned to normal in the irradiated segment. Total cholinesterase activity decreased 20-35% immediately after irradiation. On day 2 values normalized above the irradiated intestine and increased 40% in that below the irradiated segment. These values normalized throughout the intestine after 1 week. Serotonin contents decreased 80% in irradiated intestine and 50% above the irradiated portion after 24 hr. This decrease persisted for 7 days. Serotonin contents essentially normalized above the irradiated intestine within 2 weeks but remained 40% lower than normal in the irradiated portion. Monoamine oxidase activities in the irradiated intestine remained decreased for 1 week and normalized after 14 days; a significant but less persistent decrease occurred below the irradiated portion of the intestine. Pharmacological studies revealed that *in vitro* responses to acetylcholine (2×10^{-3} μg/ml) and serotonin (2×10^{-2} μg/ml) decreased after irradiation; this decreased response was of shorter duration for serotonin. This was followed by an increased response in nonirradiated portions of the intestine, particularly with acetylcholine.

2866 EFFECTS OF DIETARY CALCIUM RESTRICTION AND CHRONIC THYROPARATHYROIDECTOMY ON THE METABOLISM OF (^{3}H)25-HYDROXYVITAMIN D_3 AND THE ACTIVE TRANSPORT OF CALCIUM BY RAT INTESTINE. *(E.)*

Favus, M. J.; Walling, M. W.; Kimberg, D. V. (Harvard Med. Sch., Boston, Mass.). *J. Clin. Invest.* 53(4):1139-1148, 1974.

The chronic effects of both dietary calcium restriction and the absence of parathyroid hormone on the metabolism of 1,25-dihydroxyvitamin D_3 and duodenal calcium-active transport were studied in male albino Sherman rats given thyroid replacement. These relatively long-term studies confirm earlier observations which indicated that the adaptation of calcium absorption to a low calcium intake occurs in both sham-operated and thyroparathyroidectomized animals. The studies also demonstrate that despite reduced levels of 1,25-dihydroxyvitamin D_3 in the plasma of chronically thyroparathyroidectomized animals fed a low calcium diet, the accumulation of this metabolite in at least one target tissue, intestinal mucosa, is identical in both the sham-operated and thyroparathyroidectomized groups. A reduced, but continued level of 1,25-dihydroxyvitamin D_3 production, together with its selective accumulation by intestinal mucosa, probably explains the calcium adaptation which is observed in spite of the chronic absence of the parathyroid glands.

2867 THE MECHANISM OF BICARBONATE SECRETION IN RABBIT ILEUM EXPOSED TO CHOLERAGEN. *(E.)*

Hubel, K. A. (Dept. Med., Univ. Iowa, Iowa City). *J. Clin. Invest.* 53(4):964-970, 1974.

Net movement of H_2O and HCO_3-, and changes in pH and pCO_2 in lumenal fluid were studied in adjacent segments of rabbit ileum *in vivo*, one of which was exposed to choleragen (2.0 mg in 4 ml saline). Four hr after exposure, segments were drained and infused with gassed Krebs-Henseleit solution whose pCO_2 exceeded arterial pCO_2. After 45 min, fluid was collected anaerobically from control and cholera segments. Among 13 cholera segments, lumenal pCO_2 diminished by a mean of 8.4 torr and was less than femoral arterial blood in 6 instances. In the paired control segments, mean pCO_2 increased by 4.4 torr, and was always greater than arterial pCO_2. Dilution could not account for the low pCO_2 in cholera segments because in hypertonic solutions that caused water to move into the lumen, the pCO_2 did not differ from control values obtained with isotonic solutions. The results suggest that OH^- accumulation causes HCO_3^- secretion in cholera.

2868 REVERSAL OF CYCLIC AMP-MEDIATED INTESTINAL SECRETION BY ETHACRYNIC ACID. *(E.)* Al-Awqati, A.; Field, M.; Greenough, III, W. B. (Johns Hopkins Hosp., Baltimore, Md.). *J. Clin. Invest.* 53(3):687-692, 1974.

Unidirectional, transmural fluxes of ^{22}Na and ^{36}Cl were measured across isolated rabbit ileal mucosa. Under control conditions (short-circuited mucosa bathed in bicarbonate-Ringer), there was net absorption of Na and Cl. Theophylline (10 mM), cyclic AMP (5 mM), and cholera toxin (added *in vivo*) abolished net Na flux and produced net Cl secretion. In the presence of theophylline or cAMP, addition of 0.1 mM ethacrynic acid to the serosal bathing solution abolished net Cl secretion and restored net Na absorption. Cholera toxin-treated mucosa was exposed to 0.05 and 1.0 mM ethacrynic acid. The lower concentration restored net Na absorption but did not significantly reduce Cl secretion. The higher concentration abolished net transport of both Na and Cl. Short-circuit current and Na flux measurements in the presence and absence of glucose indicated that 0.1 mM ethacrynic acid suggested that even this concentration of ethacrynic acid does not inhibit glucose-coupled Na transport. Thus ethacrynic acid appears to specifically inhibit Cl (or NaCl) secretion without inhibiting the absorptive Na "pump". The antisecretory effect of 0.1 mM ethacrynic acid does not appear to result from inhibition of adenylate cyclase since secretion stimulated by addition of 5 mM cyclic AMP was abolished. Furthermore, 0.1 mM ethacrynic acid did not significantly reduce theophylline-augmented and cholera toxin-augmented cyclic AMP levels in ileal mucosa. It is concluded that ethacrynic acid interacts specifically with the active Cl (or NaCl) secretory mechanism of the small intestine at a step beyond generation of cyclic AMP.

2869 EFFECTS OF PROSTAGLANDINS AND CHOLERA ENTEROTOXIN ON INTESTINAL MUCOSAL CYCLIC AMP ACCUMULATION: EVIDENCE AGAINST AN ESSENTIAL ROLE FOR PROSTAGLANDINS IN THE ACTION OF TOXIN. *(E.)* Kimberg, D. V.; Field, M.; Gershon, E.; Henderson, A. (Harvard Med. Sch., Boston, Mass.). *J. Clin. Invest.* 53(3):941-949, 1974.

The effects of prostaglandins and cholera enterotoxin on cyclic AMP accumulation in rabbit ileal mucosa were examined *in vitro*. Addition of 5 μg/ml (75 μg/150 mg mucosa) of purified cholera enterotoxin produced a peak increase in cyclic AMP level in 3 hr but there was a time delay of at least 30 min before any effect was observed. Inhibition of cyclic nucleotide phosphodiesterase with theophylline (5 mM) failed to reduce this time delay. In contrast, addition of prostaglandin E_1 (PGE_1) increased the cyclic AMP level rapidly, a peak effect being observed in 2 min. The time of the peak prostaglandin-induced changes in cyclic AMP level and short-circuit current correlated closely. A maximal increment in cyclic AMP level was achieved with 5×10^{-5} M PGE_1. When 10^{-4} M PGE_1 was added to mucosa already maximally stimulated with cholera toxin, the resulting cyclic AMP level was equal to the sum of the levels reached when each agent was added alone. The effects of the enterotoxin on mucosal cyclic AMP levels were not influenced by indomethacin (5.0×10^{-5} M) under conditions where mucosal prostaglandins synthesis was inhibited. The results suggest that endogenous prostaglandins do not provide an essential link in the activation of intestinal mucosal adenyl cyclase by cholera enterotoxin. The effect of cholera enterotoxin on intestinal mucosal cyclic AMP metabolism involves a definite time delay which is not due to cyclic nucleotide phosphodiesterase activity.

2870 AMINO AND CARBOXYLIC ACIDS IN THE RABBIT CECUM. *(Fr.)* Marty, J.; Raynaud, P.; Carles, J. (Inst. Physiol., Toulouse, France). *Ann. Biol. Anim. Biochem. Biophys.* 13(3):429-451, 1973.

2871 FUNCTION AND STRUCTURE OF THE INTESTINAL MUCOSA AFTER EXTENSIVE RESECTION OF THE SMALL INTESTINE IN THE DOG. *(Fr.)* Robinson, J. W. L.; Haroud, M.; Luisier, A. L.; Winistorfer, B.; Mirkovitch, V. (Cantonal Hosp., Lausanne, Switzerland). *Biomedicine* 21(2):71-76, 1974.

2872 PROTEIN DIGESTION IN THE INTESTINE OF SHEEP. *(E.)* Ben-Ghedalia, D.; Tagari, H.; Bondi, A. (Dept. Animal Nutr., Hebrew Univ., Rehovot, Israel). *Br. J. Nutr.* 31(2):125-142, 1974.

2873 DIFFERENTIAL EFFECT OF PUROMYCIN ON TRIACYLGLYCEROL AND PHOSPHATIDYLCHOLINE SYNTHESIS IN RAT MUCOSAL MICROSOMES. *(E.)* O'Doherty, P. J. A.; Kuksis, A. (Dept. Biochem., Univ. Toronto, Canada). *Can. J. Biochem.* 52(3):170-175, 1974.

2874 INHIBITION OF INTESTINAL (Na^+-K^+)-ATPase IN EXPERIMENTAL UREMIA. *(E.)* Kramer, H. J.: Backer, A.; Kruck, F. (Med. Clin., Univ. Saarland, Homburg/Saar, Germany). *Clin. Chim. Acta* 50(1):13-18, 1974.

2875 BIOLOGICAL IDENTIFICATION OF MELATONIN IN ENTEROCHROMAFFIN CELLS. *(Rus.)* Raikhlin, N. T.; Kvetnoi, I. M. (Inst. Exp. Clin. Oncol., Moscow, USSR). *Dokl. Akad. Nauk SSSR* 215(3):731-732, 1974.

2876 ORIGIN OF INTESTINAL DISACCHARIDASES OF ASCARIS SUUM. *(E.)* Gentner, H. W.; Castro, G. A. (Health Sci. Ctr., Univ. Oklahoma, Oklahoma City). *Exp. Parasitol.* 35(1):125-131, 1974.

2877 THE GASTROINTESTINAL AND FECAL BACTERIAL FLORA OF THE MONGOLIAN GERBIL. *(E.)* Majumdar, S. K.; Carroll, W. J. (Dept. Biol., Lafayette Coll., Easton, Pa.). *Proc. Pa. Acad. Sci.* 47:199-201, 1973.

2878 KINETICS OF PHOSPHOGLUCOSE ESTER HYDROLYSIS BY RAT INTESTINAL MUCOSA. *(E.)* Sayeed, M. M.; Nunn, Jr., A. S. (Washington Univ. Sch. Med., St. Louis, Mo.). *Proc. Soc. Exp. Biol. Med.* 145(3):826-829, 1974.

See also 2570, 2572, 2573, 2650, 2665, 2714, 2866, 3041, 3042, 3088.

GENERAL

2879 EFFECTS OF THE C-TERMINAL OCTAPEPTIDE OF CHOLECYSTOKININ ON SPLANCHNIC CIRCULATION IN THE DOG. *(E.)* Thulin, L. (Karolinska Inst., Stockholm, Sweden). *Acta Chir. Scand.* 139(8): 687-690, 1973.

The vascular effects of the C-terminal octapeptide of cholecystokinin (CCK) were studied in 3 anaesthetized dogs. By using an electromagnetic flowmeter, blood flow was measured in the hepatic artery proper, the superior mesenteric artery and the portal vein. The superior pancreatico-duodenal artery was ligated and cholecystectomy was performed. Systemic, caval and portal pressures were recorded. A total of 40 infusions of 1/2-2 min duration were administered, 21 into the caval and 19 into the portal vein, in doses ranging from 0.5 to 6.5 Ivy dog units/kg/min. After CCK-octapeptide, the systemic blood pressure fell with an average of 5 mmHg. The blood flow increased by 24-36% of pre-infusion values, with no significant difference between infusion sites or dosages. The responses appeared immediately in the hepatic artery and after 1 min delay in the mesenteric artery and the portal vein. The vascular resistance decreased with 19-26%, with no significant difference between infusion sites or dosages. The blood pressure fall was probably due to vasodilation of splanchnic vessels. The delayed response in the mesenteric artery and the portal vein suggests that recirculation is of importance for the effect in these vessels, compared with the more immediate response in the hepatic artery proper. The natural CCK had a weaker effect when infused into the portal than into the caval vein, indicating a certain hepatic inactivation. The octapeptide had almost equal effects after caval and portal infusion, indicating that such a mechanism is of less importance.

2880 IMMUNOGLOBULINS AND OTHER SERUM PROTEINS IN FECES FROM INFANTS AND CHILDREN. *(E.)* Haneberg, B.; Tonder, O. (Sch. Med., Univ. Bergen, Norway). *Scand. J. Immunol.* 2(4):375-383, 1973.

Feces were collected for 9 infants (1-5 months old) and 5 children (2-12 yr old), none of whom showed signs of infections or gastrointestinal dysfunction. Unconcentrated extracts of the freeze-dried feces were screened for immunoglobulins using double diffusion techniques. IgA was present in all 14 extracts, IgG in 6, and IgM in 8. The α-chain determinants in the fecal secretions was identical to those in serum and saliva. The lowest detectable concentrations were 0.5 mg/100 ml for IgA, 0.7 mg/100 ml for IgG, and 0.8 mg/100 ml for IgM. All individua tested have serum IgA, IgG, and IgM levels within normal limits. There were no age variations in the secretion of the intestinal immunoglobulins. Most of the immunoglobulins were easily dissolved in saline. With regard to other serum proteins, α_1 antitrypsin was present in all the fecal samples while α_1 antichymotrypsin was found in 9 and α_1 macroglobulin in 5. Albumin in trace amounts was found in 3 of the samples.

2881 INTERACTION BETWEEN ESCHERICHIA COLI AND SHIGELLA FLEXNERI IN THE DIGESTIVE TRACT OF "GNOTOBIOTIC" MICE. *(E.)* Ducluzeau, R.; Raibaud, P. (Lab. Microb. Ecol., C.N.R.Z., Jouy-en-Josas, France). *Infect. Immun.* 9(4):730-733, 1974.

A strain of *Shigella flexneri* was implanted in the digestive tract of germfree C_3H mice, which were exposed 1 day later to a strain of *Escherichia coli*. The *S. flexneri* were eliminated within 8 days. However, when *S. flexneri* were monoassociated with germfree mice in the absence of *E. coli*, a population of *S. flexneri* appeared which was resistant to the antagonistic effects of *E. coli in vivo*. The emergence of this population appeared to occur *via* a stepwise process which extended over a period of 3 months. The interaction between *S. flexneri* and *E. coli in vivo* and *in vitro* was significantly different in that the *Shigella* capable of coexisting with *E. coli* in the digestive tract were suppressed by the organism *in vitro*. Selection by the host of such mutants as the resistant *S. flexneri* in a bacterial population could constitute one step in the establishment of an autochthonous microflora in the digestive tract.

2882 PORTACAVAL TRANSPOSITION IN THE RAT: A NEW TECHNIQUE AND ITS EFFECTS ON LIVER AND BODY WEIGHT. *(E.)* Ryan, C. J.; Benjamin, I. S.; Blumgart, L. H. (Roy. Infirm., Glasgow, Scotland). *Br. J. Surg.* 61(3):224-228, 1974.

Portacaval transposition by direct end-to-end anastomoses was established in male Sprague-Dawley rats

ith negligible mortality and with survival of up
› 150 days. The operation was associated with an
arly fall in body weight, followed by a recovery
eriod, the rapidity of which was related to the
reoperative weight and age of the animal. At
acrifice 35 days after surgery, the relative liver
eight of the animals with portacaval transposition
as significantly reduced although it remained sig-
ificantly higher than that in a group of animals
ith a portacaval shunt. The only histological
lange was minimal congestion of the sinusoids in
ne animals with portacaval transposition.

83 RADIOIMMUNOASSAY FOR GASTRIC INHIBITORY
POLYPEPTIDE. *(E.)* Kuzio, M.; Dryburgh,
R.; Malloy, K. M.; Brown, J. C. (Dept. Physiol.,
iv. British Columbia, Vancouver, Canada). *Gastro-
terology* 66(3):357-364, 1974.

specific radioimmunoassay for gastric inhibitory
lypeptide has been developed using guinea pig
tisera raised to porcine gastric inhibitory poly-
ptide. Highly purified ^{125}I-porcine gastric in-
bitory polypeptide, further purified on Sephadex
15 after labeling, was employed as a tracer. The
nsitivity range is 25 to 250 pg. No cross reacti-
ty could be demonstrated with gastrin, glucagon,
cretin, cholecystokinin-pancreozymin, motilin, or
soactive intestinal peptide. Reproducibility of
terminations in different assays was demonstrated.
e mean fasting serum concentration was 237 pg/ml
48 normal humans. The serum concentrations in-
eased to above 1200 pg after a meal.

84 SPECIFIC BINDING OF CHOLERA TOXIN TO ISO-
LATED INTESTINAL MICROVILLOUS MEMBRANES.
.) Walker, W. A.; Field, M.; Isselbacher, K. J.
arvard Med. Sch., Boston, Mass.). *Proc. Natl.
ad. Sci. USA* 71(2):320-324, 1974.

sucrose density gradient assay was used to demon-
rate the specificity and saturation of the binding
(^{125}I)cholera toxin to isolated intestinal
crovillous membranes from Sprague-Dawley rat in-
stine. Cholera toxin bound to the microvillous
mbranes at concentrations which produce the usual
ologic response of increased intestinal secretion.
e binding capacity appears to be saturable, which
ggests that a finite number of toxin binding sites
ist per μg of microvillous membrane. When two
ner proteins (bovine serum albumin and IgG) were
xed with intestinal membranes and placed on a
crose gradient, no binding could be demonstrated.
e affinity of cholera toxin for small intestine
thus much stronger than that of other proteins
own to adsorb to epithelial cell surfaces. When
olera toxin was complexed with antitoxin, the
nding of the toxin was inhibited. Toxin attach-
nt to intestinal binding sites was also inhibited
choleragenoid. Similar concentrations of labeled
xin stimulated the accumulation of cyclic AMP in
cosal homogenates and increased the secretion of
uid into intestinal loops, whereas the same
ncentrations of toxin mixed with antitoxin had
effect on cyclic AMP accumulation. These stud-
s suggest that cholera toxin attaches to brush border binding sites before exerting its biologic effect and that local intestinal antibody protection against cholera toxin may be due to inhibition of toxin attachment to these binding sites.

2885 DISSIMILATION OF TRYPTOPHAN AND RELATED INDOLIC COMPOUNDS BY RUMINAL MICROORGANISMS IN VITRO. *(E.)* Yokoyama, M. T.; Carlson, J. R. (Dept. Anim. Sci., Washington State Univ., Pullman). *Appl. Microbiol.* 27(3):540-548, 1974.

Intraruminal doses of L-tryptophan cause acute pulmonary edema and emphysema in cattle. The D and L isomers of tryptophan and 22 related indolic compounds were incubated with ruminal microorganisms *in vitro*. The incubation of L-(U-benzene ring-^{14}C)-tryptophan with ruminal microorganisms for 24 hr resulted in 39% of the added radioactivity being incorporated into skatole, 7% into indole, and 4% into indoleacetate (IAA). D-Tryptophan was not degraded to any of these metabolites. The major pathway of skatole formation from L-tryptophan appeared to be *via* the decarboxylation of IAA. The incubation of (2-^{14}C)IAA with ruminal microorganisms for 24 hr resulted in 38% incorporation into skatole. L-(5-Hydroxy)tryptophan was degraded into 5-hydroxyskatole and 5-hydroxyindole, whereas 5-hydroxyindoleacetate was degraded only to 5-hydroxyskatole. The incubation of indolepyruvate, indolelactate, and indolealdehyde with ruminal microorganisms resulted in the formation of both skatole and indole. Under similar conditions, indoleacetaldehyde was converted to IAA and tryptophol. The addition of increasing concentrations of glucose (0 to 110 mM) reduced the formation of both skatole and indole from L-tryptophan and resulted in the accumulation of IAA. Antibiotics reduced the degradation of L-tryptophan to skatole and indole, with kanamycin and neomycin being particularly effective in reducing the decarboxylation of IAA to skatole.

2886 THE ARTERIAL SUPPLY OF THE HUMAN STOMACH. *(E.)* El Eishi, H. I.; Ayoub, S. F.; Abd El Khalek, M. (Mansoura Fac. Med., Egypt). *Acta Anat.* 86(3-4):565-580, 1973.

2887 THE DERIVATION OF PLASMA-FREE FATTY ACIDS FROM DIETARY NEUTRAL FAT IN MAN. *(E.)* Heimberg, M.; Dunn, G. D.; Wilcox, H. G. (Vanderbilt Univ. Sch. Med., Nashville, Tenn.). *J. Lab. Clin. Med.* 83(3):393-402, 1974.

2888 CHARACTERIZATION OF GASTRIC MUCOSAL MEMBRANES. COMPOSITION OF GASTRIC CELL MEMBRANES AND POLYPEPTIDE FRACTIONATION USING IONIC AND NONIONIC DETERGENTS. *(E.)* Spenney, J. G.; Saccomani, G.; Spitzer, H. L.; Tomana, M.; Sachs, G. (VA Hosp., Birmingham, Ala.). *Arch. Biochem. Biophys.* 161(2):456-471, 1974.

2889 PROTEIN PATTERNS IN NORMAL AND INDUCED PATHOLOGICAL SALIVARY GLANDS OF MICE.

(E.) Feiglin, B.; Reade, P. C. (Dept. Dental Med., Univ. Melbourne, Victoria, Australia). *Aust. J. Exp. Biol. Med. Sci.* 52(Pt.1):173-184, 1974.

2890 FUNGAL POPULATIONS IN THE RUMEN ASSOCIATED WITH FESCUE TOXICOSIS. *(E.)* Futrell, M. C.; Farnell, D. R.; Poe, W. E.; Watson, V. H.; Coats, R. E. (Mississippi Agr. Forestry Exp. Sta., Mississippi State). *J. Environ. Quality* 3(2):140-143, 1974.

2891 r/b EXPANDERS: THEIR USE IN IDENTIFYING ROUTINELY AND UNUSUALLY REACTING MEMBERS OF ENTEROBACTERIACEAE. *(E.)* Isenberg, H. D.; Smith, P. B.; Balows, A.; Painter, B. G.; Rhoden, D. L.; Tomfohrde, K. (Long Island Jewish-Hillside Med. Ctr., New Hyde Park, N.Y.). *Appl. Microbiol.* 27(3):575-583, 1974.

2892 SODIUM, AN OBLIGATE GROWTH REQUIREMENT FOR PREDOMINANT RUMEN BACTERIA. *(E.)* Caldwell, D. R.; Hudson, R. F. (Div. Microbiol., Univ. Wyoming, Laramie). *Appl. Microbiol.* 27(3):549-552, 1974.

2893 THE EFFECT OF SIMULATED GALLSTONES ON GALLBLADDER PRESSURES AND BILE FLOW RESPONSE TO EATING. *(E.)* Gilsdorf, R. B. (VA Hosp., Minneapolis, Minn.). *Surg. Gynecol. Obstet.* 138(2):161-168, 1974.

2894 EIGHT- AND TWENTY-FOUR-HOUR CANINE PANCREAS PRESERVATIONS USING A SIMPLE GEL COOLING TECHNIQUE. *(E.)* Serrou, B.; Solassol, C.; Michel, H.; Gelis, C.; Pujol, H.; Romieu, C. (St. Eloi Hosp., Montpellier, France). *Transplantation* 16(5):398-402, 1973.

2895 BRANCHES OF THE CELIAC TRUNK AND ARTERIAL CIRCULATION IN THE LIVER OF THE HAMSTER. *(Fr.)* Sinzinger, H. F.; Unterberger, H.; Hohenecker, J. J.; Sacher, W. E. (Fac. Med., Univ. Vienna, Austria). *Okajimas Folia Anat. Jap.* 50(1):1-8, 1973.

2896 INHIBITION OF RAT LIVER MITOCHONDRIAL OXIDATIVE PHOSPHORYLATION BY SULFOBROMOPHTHALEIN. *(E.)* Killenberg, P. G.; Hoppel, C. L. (Dept. Pharmacol., Case Western Reserve Univ., Cleveland, Ohio). *Mol. Pharmacol.* 10(1):108-118, 1974.

2897 CIRCADIAN RHYTHMICITY IN CULTURED LIVER CELLS. II. RE-INDUCTION OF RHYTHMICITY IN TYROSINE AMINOTRANSFERASE ACTIVITY. *(E.)* Hardeland, R. (1st Zool. Inst., Univ. Gottingen, Germany). *Int. J. Biochem.* 4(24):591-595, 1973.

2898 CIRCADIAN RHYTHMICITY IN CULTURED LIVER CELLS. I. RHYTHMS IN TYROSINE AMINOTRANSFERASE ACTIVITY AND INDUCIBILITY AND IN [^{3}H]-LEUCINE INCORPORATION. *(E.)* Hardeland, R. (1st Zool. Inst., Univ. Gottingen, Germany). *Int. J. Biochem.* 4(24):581-590, 1973.

2899 EXPERIMENTAL STUDY OF INTERACTIONS BETWEEN CIRCULATION IN THE HEPATIC ARTERY AND PORTAL VEIN. *(Ger.)* Hahnloser, P.; Tibblin, S.; Kock, N. G. (Cantonal Hosp., Zurich, Switzerland). *Helv. Chir. Acta* 41(1/2):29-34, 1974.

2900 HORMONAL REGULATION OF RAT LIVER CELLS CULTURED IN CHEMICALLY DEFINED MEDIUM. DEXAMETHASONE AND INSULIN EFFECTS ON DIFFERENT FORMS OF TYROSINE 2-OXOGLUTARATE TRANSAMINASE. *(E.)* Gerschenson, L. E.; Davidson, M. B.; Andersson, M. (Univ. California Sch. Med., Los Angeles). *Eur. J. Biochem.* 41(1):139-148, 1974.

2901 EFFECT OF PHYSICAL EXERCISE ON SUGAR METABOLISM. *(Cz.)* Brodan, V.; Kuhn, E.; Pechar, J. (Inst. Clin. Exp. Med., Prague, Czechoslovakia). *Cesk. Fysiol.* 22(6):596-599, 1973.

2902 METABOLIC DIFFERENCES BETWEEN SOME DIETARY SUGARS. *(Cz.)* Vrana, A.; Fabry, P.; Kazdova, L.; Slabochova, Z. (Inst. Clin. Exp. Med., Prague, Czechoslovakia). *Cesk. Fysiol.* 22(6):574-577, 1973.

2903 NEURAMINIDASE IN PIG GASTRIC MUCUS. *(E.)* Allen, A.; Starkey, B. J. (Dept. Biochem., Univ. Newcastle upon Tyne, England). *Biochim. Biophys. Acta* 338(2):364-368, 1974.

2904 INCIDENCE OF COLICIN-PRODUCING E. Coli IN THE INTESTINAL FLORA OF HEALTHY PIGS. *(Ger.)* Willinger, H.; Trcka, J. (Vet. Coll., Vienna, Austria). *Zentralbl. Bakteriol. [Orig. A]* 225(2-3):406-415, 1973.

2905 A STUDY ON THE ACTION OF NORADRENALINE ON IONIC CONTENT AND SODIUM, POTASSIUM AND CHLORIDE EFFLUXES IN THE RAT PORTAL VEIN. *(E.)* Wahlstrom, B. A. (Dept. Zoophysiol., Univ. Goteborg, Sweden). *Acta Physiol. Scand.* 89(4):522-530, 1973.

2906 THE GLYCOLIPIDS OF CANINE INTESTINAL MUCOSA, EXTERNAL MUSCLE, AND GASTRIC MUCOSA. *(E.)* McKibbin, J. M.; Lyerly, D. F. (Dept. Biochem., Univ. Alabama, Birmingham). *Ala. J. Med. Sci.* 10(3):299-304, 1973.

2907 A 3α- AND 7α-HYDROXYSTEROID DEHYDROGENASE ASSAY FOR CONJUGATED DIHYDROXY-BILE ACID MIXTURES. *(E.)* Macdonald, I. A.; Williams, C. N.; Mahony, D. E. (Clin. Res. Ctr., Dalhousie Univ., Halifax, Canada). *Anal. Biochem.* 57(1):127-136, 1974.

2908 BLOOD GROUP A ACTIVE CERAMIDE HEXASACCHARIDE LACKING N-ACETYLGLUCOSAMINE ISOLATED FROM HOG STOMACH MUCOSA. *(E.)* Slomiany, B. L.; Slomiany, A.; Horowitz, M. I. (New York Med. Coll., Valhalla). *Biochim. Biophys. Acta* 326(2):224-231, 1973.

2909 MULTIPLICITY OF CYTOCHROME P_{450} HEMOPROTEINS IN RAT LIVER MICROSOMES. *(E.)* Welton, A. F.; Aust, S. D. (Dept. Biochem., Michigan State Univ., East Lansing). *Biochem. Biophys. Res. Commun.* 56(4):898-906, 1974.

2910 INDUCTION OF ENZYME ACTIVITY DURING FETAL DEVELOPMENT. THE APPEARANCE OF ORNITHINE TRANSCARBAMYLASE ACTIVITY IN RAT LIVER. *(E.)* Schuit, K. E.; Dickie, M. W. (Univ. Virginia, Sch. Med., Charlottesville). *Biol. Neonate* 23(3/4):171-179, 1973.

2911 MULTIPLE MITOCHONDRIAL FORMS OF ACETOACETYL-CoA THIOLASE IN RAT LIVER: POSSIBLE REGULATORY ROLE IN KETOGENESIS. *(E.)* Huth, W.; Dierich, C.; von Oeynhausen, V.; Seubert, W. (Inst. Physiol. Chem., Univ. Gottingen, Germany). *Biochem. Biophys. Res. Commun.* 56(4):1069-1077, 1974.

2912 CROSS-REACTIVITY BETWEEN HEAT LABILE ENTEROTOXINS OF VIBRIO CHOLERAE AND ESCHERICHIA COLI IN NEUTRALIZATION TESTS IN RABBIT ILEUM AND SKIN. *(E.)* Holmgren, J.; Soderlind, O.; Wadstrom, T. (Inst. Med. Microbiol., Univ. Goteborg, Sweden). *Acta Pathol. Microbiol. Scand.* [*B*] 81(6): 757-762, 1973.

2913 INTESTINAL GLYCOPROTEINS OF GERMFREE RATS. II. FURTHER STUDIES ON THE CHEMICAL COMPOSITION OF WATER-SOLUBLE EXTRACTS FROM INTESTINAL MUCOSA. *(E.)* Wold, J. K.; Midtvedt, T.; Winsnes, R. (Dept. Pharmacol., Univ. Oslo, Norway). *Acta Chem. Scand.* 27(8):2997-3002, 1973.

2914 PORTACAVAL SHUNTS IN THE RAT. II. SURGICAL TECHNIQUE AND POSTOPERATIVE COURSE. *(It.)* Pettirossi, O.; di Pietrantonio, M.; Cherubini, M.; Milone, E. (Inst. Clin. Gen. Gurg. Surg. Ther., Univ. Trieste, Italy). *Policlinico (Chir.)* 80(1):48-58, 1973.

See also 2656, 2682, 2726, 2734, 2869, 2884, 2896, 2897, 2912, 3304.

DIAGNOSTIC PROCEDURES

2915 ISCHEMIC COLITIS DIAGNOSED BY EARLY COLONOSCOPY. *(E.)* McNeill, C.; Green, G.; Bannayan, G.; Weser, E. (Univ. Texas Med. Sch., San Antonio). *Gastrointest. Endosc.* 20(3):124-126, 1974.

A patient is described in whom colonoscopy with biopsy established ischemic injury as the etiology for painless rectal hemorrhage. A 59-yr-old Mexican-American laborer was admitted to the hospital because of a painful mass in his left inguinal region. The pain increased in intensity over 2 days, and he developed progressive nausea and vomiting. The patient denied previous abdominal pain, diarrhea, rectal bleeding, black stools, or other gastrointestinal symptoms. An emergency left inguinal herniorrhaphy was performed. At operation, an incarcerated, but not ischemic appearing colon was found in the hernia sac. Four hours postoperatively, the patient developed dark, painless, bloody diarrhea. Proctoscopy showed a normal mucosa with blood coming from above 20 cm. Ten hours postoperatively colonoscopy was performed. A 30 cm segment of descending colon just distal to the splenic flexure was observed to have a hemorrhagic, friable, and ulcerative mucosa. Biopsy of the involved region showed loss of mucosal epithelium, submucosa, edema, and hemorrhage, and ghost-like bare crypts, typical of an ischemic insult. Reoperation was avoided and the patient made a rapid, uneventful recovery.

2916 HEPATITIS AND BILIARY ATRESIA: MEASURING SERUM-ALPHA-FETOPROTEIN. *(E.)* Zeltzer, P. M.; Neerhout, R. C.; Fonkalsrud, E. W.; Stiehm, E. R. (Univ. California, Sch. Med., Los Angeles). *Lancet* 1(7854):373-375, 1974.

Using a qualitative Ouchterlony double-diffusion procedure with specific antiserum, α-fetoprotein was detected in the serum of 10 of 11 infants with neonatal hepatitis, and was absent in the serum of 7 of 8 infants with biliary atresia. These differences were confirmed by a quantitative radial diffusion immunoassay, in which the peak levels of serum α-fetoprotein in neonatal hepatitis were significantly higher than in biliary atresia. An α-fetoprotein concentration of 4.0 mg/100 ml or greater was regularly associated with neonatal hepatitis. α-Fetoprotein concentrations remained high throughout the course of the hepatitis, reaching peak levels slightly later than serum-bilirubin or serum-transaminase. It is postulated that the compensatory response to neonatal hepatitis by the liver parenchyma is proliferation, retrodifferentiation, and renewal of α-fetoprotein synthesis. By contrast, the compensatory response to biliary atresia is proliferation of biliary tissue incapable of α-fetoprotein synthesis.

2917 ENDOSCOPIC DIAGNOSIS OF ESOPHAGEAL INFLAMMATION. *(E.)* Hattori, K.; Winans, C. S.; Archer, F.; Kirsner, J. B. (Dept. Med., Univ. Chicago, Ill.). *Gastrointest. Endosc.* 20(3): 102-104, 1974.

The histologic appearance of biopsy specimens from the distal esophagus of 10 normal subjects and 57 patients with endoscopic evidence of esophagitis has been reviewed. While only 10% of normal subjects demonstrated a polymorphonuclear leukocyte infiltrate of the mucosa or lamina propria, such an infiltrate was present in 81.1% of esophagitis patients with erythema (11), 83.8% of those with erosions (31), and 80% of those with nodularity (15). Mononuclear cell infiltrates of the lamina propria were seen in both normal and esophagitis patients and their presence does not seem to be a useful criterion for the diagnosis of esophagitis. Careful inspection of the vascular pattern of the distal esophagus with fiberoptic endoscope is helpful in detecting cases of mild esophagitis, and a fine nodularity of the mucosa on close inspection is also a useful sign of esophageal inflammation.

2918 TECHNETIUM-99m PERTECHNETATE IMAGING IN DIAGNOSIS OF MECKEL'S DIVERTICULUM. *(E.)* Leonidas, J. C.; German, D. R. (Children's Mercy St. Luke's Hosp., Kansas City, Mo.). *Arch. Dis. Child.* 49(1):21-26, 1974.

Technetium-99m pertechnetate imaging was performed on 13 patients (6 males and 7 females, aged 1 day to 16 yr) suspected of having Meckel's diverticulum, mainly because of unexplained rectal bleeding (11 cases). The patients were injected i.v. with 100 μCi of ^{99m}Tc pertechnetate, and images of the abdomen were made at 15, 30, and 45 min after injection. Radionuclide imaging was positive in 3 cases. In 2 of these cases subsequent laparotomy confirmed the presence of a Meckel's diverticulum with ectopic gastric mucosa. In both cases conventional x-ray studies had been repeatedly negative. The 3rd patient with a positive scan refused surgery, but the gastric mucosa in an ectopic location in this case represented either a Meckel's diverticulum or a duplication with ectopic gastric mucosa. A Meckel's diverticulum was also found in 1 of 2 cases who had laparotomies despite negative scans; contrast x-ray studies were negative in this patient. It is concluded that abdominal imaging is useful in the preoperative diagnosis of symptomatic Meckel's diverticulum.

2919 γ-GLUTAMYL TRANSPEPTIDASE AND 5'-NUCLEOTIDASE: COMPARISON AS DIAGNOSTICS FOR HEPATIC DISEASE. *(E.)* Boone, D. J.; Routh, J. I.; Schrantz, R. (Dept. Path., Univ. Iowa, Iowa City). *Am. J. Clin. Pathol.* 61(3):321-327, 1974.

The enzymic activities of γ-glutamyl transpeptidase and 5'-nucleotidase were evaluated in 189 patients in whom hepatobiliary-tree disease was suspected. γ-Glutamyl transpeptidase was a better indicator of diseases of the liver, bile duct, and pancreas than was 5'-nucleotidase in 9 out of 10 conditions studied. 5'-Nucleotidase was almost as useful as γ-glutamyl transpeptidase in indicating hepatobiliary disease in patients with granuloma of the liver, acute pancreatitis, congestive heart failure, rheumatoid arthritis, and carcinoma metastatic to the liver. γ-Glutamyl transpeptidase was most elevated in patients with primary carcinoma of the pancreas. Patients with carcinoma metastatic to bone or with neurologic conditions had both enzymes elevated, but elevations occurred in a much lower proportion of these patients than patients with hepatobiliary-tree disease. Liver scan findings correlated better with γ-glutamyl transpeptidase than with 5'-nucleotidase or alkaline phosphatase enzymic activity.

2920 AMOEBIC ABSCESS OF THE LIVER: SCANNING AND SELECTIVE HEPATIC ARTERIOGRAPHY. *(E.)*

Viana, R. L.; Rego, A.; Dias, F. A. A. (Dept. Med. III, Univ. Lourenco Marques, Mozambique). *S. Afr. Med. J.* 48(3):96-100, 1974.

Twenty patients with amoebic abscess of the liver were submitted to clinical, radiological, parasitological, hematological, and isotopic scanning with rose bengal, selective arteriographic examinations, and liver function tests. In the 16 patients submitted to isotopic scanning, the procedure showed morphological and topographical changes with enlargement of the liver in all cases. A lesion was evident in 11 cases, absent in 2, and doubtful in 3. Isotopic scanning failed to show lesions in 2 confirmed cases of amebic abscess of the liver, but it did show a lesion in 1 case of amebic hepatitis. Selective hepatic arteriography indicated liver abscess in 15 cases, extrahepatic abscess in 1 case, no lesion in 1 case, and doubtful lesions in 2 cases. Selective hepatic arteriography was informative concerning the site of lesions in abscess cases, but did not show any change in a case of amebic hepatitis. Both isotopic scanning and selective arteriography failed to demonstrate a small abscess in the tip of the left lobe of the liver. Both methods gave evidence of cure and disappearance of the abscess in the majority of patients given medical treatment. In 1 case, the isotopic scanning showed an existing lesion after treatment which was not confirmed by arteriography. The accuracy of the 2 methods in detecting amebic abscesses of the liver is comparable, but arteriography offers additional advantages in that it enables diagnosis of the nature of the lesions and allows the progress of the condition to be followed.

2921 LIVER SCAN IN HYPERLIPOPROTEINEMIA. *(E.)*

Sachs, B. A.; Bardfeld, P. A.; Bodian, J. E.; Sugarman, L. A.; Hellman, L. (Albert Einstein Coll. Med., Bronx, N. Y.). *JAMA* 227(8):907-910, 1974.

Liver scans with technetium 99m sulfur colloid were obtained in 48 subjects (24 women and 24 men, aged 37-76 yr) with hyperlipoproteinemia who were being treated with various lipid-lowering drug regimens or were receiving no therapy. Liver scans were abnormal in 27 of the 48 cases, but the abnormalities could not be firmly attributed to a specific lipoprotein phenotype or treatment regimen. Of the 27 abnormal liver scans, 21 showed a patchy decrease in uptake; 3, both patchy and focal decreases in uptake; and 3, only focal decreases in uptake. Of the 21 patients with elevated triglyceride levels, 15 (71%) had abnormal liver scans. Hypertriglyceridemia was present in 55% of the subjects with abnormal liver scans compared to 28% of the subjects in whom the scans were normal. The average triglyceride level for the subgroup with abnormal liver scans was 324 mg/100 ml compared with 214 mg/100 ml for those with normal scans. Hyperlipoproteinemia should be considered as a possible associated factor in evaluating an abnormal liver scan. The patchy or focal decreases in sulfur colloid uptake may have resulted from a lipoprotein-laden reticuloendothelial system.

2922 SIMULTANEOUS COMBINED PANCREATIC TEST. *(E.)*

Nundy, S.; Shirley, D.; Beales, J. S. M.; O'Higgins, N.; Heaf, R.; Pearse, E. E.; Lavender, J. P.; Baron, J. H. (Roy. Postgrad. Med. Sch., London, England). *Br. Med. J.* 1(5898): 87-90, 1974.

In one morning, with only one intubation of the duodenum, and with no side effects, the following established tests of the pancreas can be performed: exocrine pancreatic secretion of bicarbonate, enzymes, and radioactive selenium, isotopic scanning, hypotonic duodenography, and cytology. Of 48 patients with the possible diagnosis of pancreatic disease, 14 had no pancreatic disease; 5 had stones in the common bile duct; 2 had carcinoma in the hepatic ducts; the other 34 patients had not developed any evidence of pancreatic disease. Three patients with classical attacks of acute pancreatitis were tested. There were 8 patients with chronic pancreatitis and 8 patients with carcinoma. There was no significant difference between the means of the plateau bicarbonate output in each of the 4 groups of patients studied. Cytology correctly forecast 6 of the 7 pancreatic carcinomas and 53 of the 54 noncarcinomas; however, a pancreatic scan was of little help. All but 1 of the patients without pancreatic disease and all those recovering from acute pancreatitis had higher scores than those with chronic pancreatitis. The combined test almost completely discriminated between patients without pancreatic disease, those with chronic pancreatitis, and those with carcinoma of the pancreas.

2923 LIVER BIOPSY AND PROGNOSIS IN ACUTE LIVER FAILURE. *(E.)*

Scotto, J.; Opolon, P.; Eteve, J.; Vergoz, D.; Thomas, M.; Caroli, J. (Hosp. St. Antoine, Paris, France). *Gut* 14(12): 927-933, 1973.

Liver biopsy was performed in 38 patients with fulminant hepatitis and coma and repeated in 22. Stereological estimation of hepatocyte volume was correlated with levels of clotting factors. Early liver biopsy allowed prognosis in 55% of the cases. All patients with a hepatocyte volume of 35% and thromboplastin time less than 11% died; all patients but two with hepatocyte volume greater than 34% and thromboplastin time greater than 10% recovered consciousness (n=9) or at least showed evidence of marked liver regeneration (n=2). On serial liver biopsy a significant increase in hepatocyte volume and clotting factors was only observed in patients who recovered consciousness. The estimated liver cell mass after regeneration in patients who recovered consciousness was greater than 44% and less than 45% in the patients who did not. As no bleeding occurred in any of these 38 patients, serial liver biopsy is suggested as a method for evaluating liver regeneration and prognosis in acute liver failure. Systematically repeated liver biopsy may help to determine the critical cell mass allowing recovery of consciousness and survival after regeneration of the liver. From this preliminary study such a mass would be 45% of the total liver volume.

2924 RETROGRADE ENDOSCOPIC PANCREATOGRAPHY. *(Ger.)* Koch, H.; Classen, M.; Demling, L. (Med. Clin., Univ. Erlangen, Germany). *Dtsch. Med. Wochenschr.* 99(14):708-710, 1974.

2925 ESOPHAGEAL ENDOSCOPY. *(Ger.)* Rosch, W.; Weidenhiller, S.; Fuchs, H. F. (Med. Clin., Univ. Erlangen, Germany). *Radiologe* 13(9):361-365, 1973.

2926 GASTROFIBROSCOPY IN COMBINED DIAGNOSIS OF STOMACH DISEASES. *(Rus.)* Salikhov, I. A.; Safin, T. F. (S. V. Kurashov Med. Inst., Kazan', USSR). *Kazan. Med. Zh.* (6):49-51, 1973.

2927 COMPARATIVE EVALUATION OF THE INSULIN AND HISTAMINE TESTS IN PATIENTS WITH DUODENAL ULCER. *(Rus.)* Kataeva, G. A.; Zhupan, V. F.; Satsukevich, V. N.; Mikhailova, E. N. (no affil.). *Kazan. Med. Zh.* (6):87-88, 1973.

2928 DIGITAL PANCREATIC SCANNING WITH ELECTRONIC SUBTRACTION OF THE LIVER MAP AND ANALYSIS BY RECORDING ON MAGNETIC TAPE. *(It.)* Abbati, A.; Rossi, A.; Turba, E.; Ansaloni, R. (Dept. Nuclear Med. Sanit. Phys., Bologna Hosp., Italy). *Boll. Soc. Ital. Biol. Sper.* 48(23):1010-1015, 1972.

2929 THE RADIOLOGIST FACED WITH THE PROBLEM OF HIATUS HERNIA. *(It.)* Dalla Palma, L.; Bacarini, L. (Inst. Radiol., Univ. Trieste, Italy). *Minerva Med.* 64(81):4263-6280, 1973.

2930 EARLY RADIOLOGICAL AND CLINICAL DIAGNOSIS OF STOMACH CANCER. *(Rum.)* Jocu, I.; Ilie, E. (Dr. I. Cantocuzino Hosp., Bucharest, Rumania). *Med. Interna (Bucur.)* 25(5):537-546, 1973.

2931 COMPARATIVE EVALUATION OF SOME BIOCHEMICAL TESTS IN THE DIAGNOSIS OF CHRONIC PANCREATITIS. *(Rus.)* Panchenko, N. I.; Zharkovskaia, A. Ia. (Khar'kov Sci. Res. Inst. Gen. Emergency Surg., USSR). *Lab. Delo* (8):482-484, 1973.

2932 VALUE OF DIASTASE AND AMYLASE IN THE DIAGNOSIS OF ACUTE PANCREATITIS. *(Ger.)* Zastrow, F. (Central Hosp., Bremen-Nord, Germany). *Med. Welt* 24(48):1897-1902, 1973.

2933 THE DIAGNOSTIC VALUE OF SOME INVESTIGATIVE PROCEDURES IN THE MOST IMPORTANT STOMACH DISEASES. *(Ger.)* Pusch, H. F.; Strik, W. O.; Liebscher, W. (Med. Polyclin., Univ. Wurzburg, Germany). *Med. Welt* 24(44):1685-1687, 1973.

2934 ON THE DIFFERENTIAL DIAGNOSIS OF POLYP-LIKE FINDINGS IN THE ILEOCECAL REGION. *(Ger.)* Rotte, K. H.; Mateev, B. (Central Inst. Cancer Res., Berlin, Germany). *Radiol. Diagn.* 14(1):39-47, 1973.

2935 QUANTITATIVE IMMUNOELECTROPHORESIS AS A METHOD FOR DETERMINATION OF HEPATITIS B ANTIGEN. STANDARDIZATION AND COMPARISON WITH OTHER METHODS. *(Ger.)* Yano, M.; Tripatzis, I. (Hannover Med. Coll., Germany). *Z. Immunitaetsforsch.* 146(2):174-186, 1973.

2936 ENDOSCOPIC FEATURES IN VIRAL HEPATITIS AND ITS COMPLICATIONS. *(It.)* de Lalla, F.; Esposito, R. (Inst. Infect. Dis., Univ. Milan, Italy). *Gaz. Sanit.* 44(3):97-102, 1973.

2937 EARLY ENDOSCOPIC DIAGNOSIS OF GASTROINTESTINAL BLEEDING FROM ULCERATIVE AND EROSIVE LESIONS. *(It.)* Visintini, E.; Belsasso, E. (Osp. Maggiore, Trieste, Italy). *Minerva Med.* 64(90):4738-4741, 1973.

2938 EXCRETORY PANCREATOGRAPHY IN MUCOVISCIDOSIS. *(Ger.)* Rosenstrauch, L. S.; Demin, V. A.; Gingol, A. I.; Fadeeva, M. A.; Landa, N. M. (Moscow Res. Inst. Roentgenol. Radiol., USSR). *Radiol. Diagn.* 14(1):23-30, 1973.

2939 IMMUNOLOGICAL DIAGNOSIS OF AMEBIASIS IN PERSONS RETURNING FROM THE TROPICS. *(Ger.)* Felgner, P.; Mohr, W.; Mannweiler, E. (Bernhard Nocht Inst. Naval Trop. Dis., Hamburg, Germany). *Dtsch. Med. Wochenschr.* 98(45):2127-2131, 1973.

2940 MODERN ENDOSCOPY OF THE ALIMENTARY TRACT. *(E.)* Wolff, W. I.; Shinya, H. (no affil.). *Curr. Probl. Surg.* 1-62, 1974.

2941 PHARMACORADIOLOGY OF THE GASTROINTESTINAL TRACT. *(E.)* Gohel, V. K.; Dalinka, M. K.; Mandell, G. A.; Azimi, F. (Thomas Jefferson Univ. Hosp., Philadelphia, Pa.). *C. R. C. Crit. Rev. Clin. Radiol. Nucl. Med.* 5(1):69-110, 1974.

2942 INFLAMMATORY BOWEL DISEASE: A SYMPOSIUM. I. THE RADIOLOGICAL DIFFERENTIAL DIAGNOSIS

BETWEEN ULCERATIVE AND GRANULOMATOUS (CROHN'S) COLITIS. *(E.)* Friedland, G. W. (Stanford Univ. Sch. Med., Calif.). *Calif. Med.* 119(5):14-35, 1973.

2943 CULTURE OF HEPATITIS B VIRUS ON A HUMAN CELL LINE OF HEPATIC ORIGIN. PRELIMINARY RESULTS. *(F.)* Panouse-Perrin, J.; Rachman, F.; Courouce-Pauty, A. M.; Dupuy, J. M. (Fac. Pharm. Sci., Paris, France). *Biomedicine* 19(10):442-446, 1973.

2944 THE MECONIUM PLUS SYNDROME. ROENTGEN EVALUATION AND DIFFERENTIATION FROM HIRSCHSPRUNG'S DISEASE AND OTHER PATHOLOGIC STATES. *(E.)* Pochaczevsky, R.; Leonidas, J. C. (Mt. Sinai Hosp., New York, N.Y.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 120(2):342-352, 1974.

2945 PNEUMATOSIS INTESTINALIS IN THE NEONATE. *(E.)* Robinson, A. E.; Grossman, H.; Brumley, G. W. (Duke Univ. Med. Ctr., Durham, N.C.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 120(2):333-341, 1974.

2946 "WINDSOCK SIGN" OF CONGENITAL MEMBRANOUS ATRESIA OF THE COLON. *(E.)* Blank, E.; Afshani, E.; Girdany, B. R.; Pappas, A. (Univ. Oregon Med. Sch., Portland). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 120(2):330-332, 1974.

2947 TOMOGRAPHIC DEMONSTRATION OF THE COMMON BILE DUCT FOLLOWING NONVISUALIZATION AT ORAL CHOLECYSTOGRAPHY. *(E.)* Kalisher, L.; Sternhill, V.; Ferrucci, Jr., J. T. (Harvard Med. Sch., Boston, Mass.). *Am. J. Gastroenterol.* 60(6):632-634, 1973.

2948 THE SIGNIFICANCE OF SPLEEN COLLOIDAL GOLD AU^{198} UPTAKE IN LIVER CANCER. *(E.)* Cotul, S.; Szantay, I.; Ban, A.; Nicoara, G. (Third Med. Clin., Cluj, Rumania). *Am. J. Gastroenterol.* 60(6):585-591, 1973.

2949 THE EARLY DETECTION OF CARCINOMA OF THE ESOPHAGUS. *(E.)* Anonymous (Chinese Acad. Med. Sci., Peking). *Sci. Sinica* 16(3):457-463, 1973.

2950 CLINICO-LAPAROSCOPIC OBSERVATIONS IN SOME ABDOMINAL DISEASES. *(Rus.)* Atadzhanov, V. A.; Norkulov, T. T.; Shcheglova, N. D. (Abwali ibni Sino Med. Inst., Tadzhikitan, USSR). *Zdravookhr. Tadzhikistana* 5:22-24, 1973.

2951 SCINTIGRAPHY OF THE PANCREAS BY THE SUBTRACTION METHOD AFTER ADMINISTRATION OF TWO RADIONUCLIDES. *(Cz.)* Kuba, J.; Kuchar, O.; Kojecky, Z.; Simek, J. (Palacky Univ., Olomouc, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 27(6):381-389, 1973.

2952 THE USE OF GLUCAGON FOR HYPOTONIC DUODENOGRAPHY. *(Ger.)* Novak, D.; Probst, P. (Radiol. Clin., Univ. Hamburg, Germany). *Dtsch. Med. Wochenschr.* 98(44):2352-2354, 1973.

2953 A MODEL FOR THE CINEFLUOROSCOPIC AND MANOMETRIC STUDY OF CHRONIC INTESTINAL OBSTRUCTION. *(E.)* De Lorimier, A. A.; Norman, D. A.; Gooding, C. A.; Freger, L. (Univ. California Med. Ctr., San Francisco). *J. Pediatr. Surg.* 8(5):785-791, 1973.

2954 KETOACID STUDIES IN INDIAN CHILDHOOD CIRRHOSIS - PART II. *(E.)* Singh, H.; Dhatt, P. S.; Gupta, H. L. (Med. Coll. Hosp., Rohtak, India). *Indian J. Med. Res.* 61(8):1180-1186, 1973.

2955 BAROSPERSE AND MIXOBAR. *(Sw.)* Cederblom, S.; Gaulitz, A. (Central Hosp., Molndal, Sweden). *Lakartidningen* 70(32):2783-2785, 1973.

2956 SLOW INJECTION HEPATIC ANGIOGRAPHY. A COMPARISON WITH A HIGH INJECTION RATE. *(E.)* Kaude, J.; Jensen, R.; Wirtanen, G. W. (Univ. Hosp., Lund, Sweden). *Acta Radiol.* 14(6):700-712, 1973.

2957 EFFECTS OF PATIENT AGE AND PREVIOUS OPERATIONS ON COMPLETENESS OF SIGMOIDOSCOPY. *(E.)* Ramos, R.; Spencer, R. J.; O'Brien, P. C.; Hill, J. R. (Mayo Clin., Rochester, Minn.). *Dis. Colon Rectum* 17(1):61-63, 1974.

2958 DIAGNOSIS OF EARLY GASTRIC CANCER BY MEANS OF BIOPSY. *(Ger.)* Tanaka, H.; Fukumoto, S.; Okita, E.; Sakumoto, K.; Ishihara, K. (Tottori Univ. Sch. Med., Yonago City, Japan). *Leber Magen Darm* 3(2):69-72, 1973.

2959 HEPATITIS B ANTIGEN (AUSTRALIA ANTIGEN) IN THE URINE. *(Ger.)* Carneiro de Moura, M. (Med. Clin., Univ. Lisbon, Portugal). *Munch. Med. Wochenschr.* 115(51-52):2303-2306, 1973.

2960 NEWER DIAGNOSTIC TECHNIQUES: RECTOCOLONIC EXFOLIATIVE CYTOLOGY - A NEW APPROACH. *(E.)* Katz, S. (no affil.). *Dis. Colon Rectum* 17(1):3-5, 1974.

2961 PROGRESS REPORT. COLONOSCOPY. *(E.)* Williams, C.; Teague, R. (St. Mark's Hosp., London, England). *Gut* 14(12):990-1003, 1973.

2962 HEPATIC SCINTIANGIOGRAPHY IN MALIGNANT PARASITIC TUMORS. *(E.)* Coates, G.; Stadalnik, R. C.; Palmer, J. M.; DeNardo, G. L.

(Univ. California Sch. Med., Davis). *J. Nucl. Med.* 15(2):137-139, 1974.

2963 PEG TEST: A NEW RADIOIMMUNOASSAY FOR THE DETECTION OF HEPATITIS B ANTIGEN. *(E.)* Lambert, P. H.; Tribollet, E.; Knoepfel, M.; Madalinski, K.: Miescher, P. A. (WHO Res. Unit, Geneva, Switzerland). *Schweiz. Med. Wochenschr.* 104(4):128-129, 1974.

2964 RIM SIGN IN CHOLEDOCHAL CYST: ADDITIONAL DIAGNOSTIC FEATURE. *(E.)* Rabinowitz, J. G.; Kinkhabwala, M. N.; Rose, J. S. (Dept. Radiol., State Univ. New York, Brooklyn). *J. Can. Assoc. Radiol.* 24(3):226-230, 1973.

2965 LIVER SCAN IN A CASE OF HEPATIC INFARCT. *(E.)* Chandra, S.; Laor, Y. G. (Buffalo Gen. Hosp., N.Y.). *J. Nucl. Med.* 14(11):858-860, 1973.

2966 DRIP INFUSION CHOLANGIOGRAPHY IN THE DIAGNOSIS OF CYSTIC DUCT OBSTRUCTION. *(E.)* Rosenfield, N.; Rosenfield, A.; Sanders, R. C. (Johns Hopkins Hosp., Baltimore, Md.). *J. Can. Assoc. Radiol.* 24(3):221-222, 1973.

2967 X-RAY AND ENDOSCOPIC DIAGNOSIS OF EARLY GASTRIC CANCER. *(Ger.)* Shirakabe, H.; Nishizawa, N.; Hayakawa, H.; Maruyama, M. (Juntendo Univ. Sch. Med., Tokyo, Japan). *Leber Magen Darm* 3(2):60-63, 1973.

2968 ENDOSCOPIC POLYPECTOMY IN THE UPPER GASTROINTESTINAL TRACT. *(Ger.)* Classen, M.; Zeus, J.; Demling, L. (Med. Clin., Univ. Erlangen, Nurnberg, Germany). *Leber Magen Darm* 3(4):163-165, 1973.

2969 ENDOSCOPIC DIFFERENTIAL DIAGNOSIS IN EARLY GASTRIC CANCER. *(Ger.)* Okabe, H.; Mitsui, K.; Tamechika, Y.; Niizeki, K. (Kitazato Univ. Sch. Med., Kanagawa, Japan). *Leber Magen Darm* 3(2):64-68, 1973.

2970 NEWER DIAGNOSTIC TECHNIQUES: FIBERCOLONOSCOPY IN DIAGNOSIS AND TREATMENT. *(E.)* Shinya, H. (no affil.). *Dis. Colon Rectum* 17(1):6-9, 1974.

2971 NEWER DIAGNOSTIC TECHNIQUES: ARTERIOGRAPHY IN COLORECTAL DISEASE. *(E.)* Watson, R. C. (no affil.). *Dis. Colon Rectum* 17(1):10-12, 1974.

2972 THE CONTRIBUTION OF PERCUTANEOUS LIVER BIOPSY TO THE MANAGEMENT OF LIVER DISEASE. *(E.)* Bain, B. J.; Harris, O. D.; Quinn, R. L. (Princess Alexandra Hosp., Brisbane, Australia). *Med. J. Aust.* 2(4):160-163, 1973.

See also 2634, 2975, 3162, 3174.

GASTROINTESTINAL DISEASES

ESOPHAGUS

2973 EFFICACY OF CONTINUOUS INTRA-OESPHAGEAL ANTACID DRIP THERAPY IN THE TREATMENT OF REFLUX OESOPHAGITIS. A QUANTITATIVE ASSESSMENT USING THE ACID PERFUSION TEST. *(E.)* Serebro, H. A.; Friedman, M.; Beck, I. T. (Dept. Med., Univ. Witwatersrand, South Africa). *S. Afr. Med. J.* 47(36): 1656-1659, 1973.

A simple method of determining the efficacy of antacid therapy in the treatment of clinical esophagitis is presented. Antacid pretreatment modifies the patient's response to esophageal acid perfusion, as early as 24 hr after continuous intra-esophageal antacid perfusion is begun, and also by 72 hr after commencement of therapy with oral antacids. This data explains why false negative acid perfusion tests can occur in the presence of biopsy-proved esophagitis, when such patients have been treated with antacids prior to the performance of the acid perfusion tests. Continuous water perfusion therapy is ineffective in modifying the patient's response to acid perfusion of the esophagus. This study demonstrates that the patient's response to acid perfusion of the esophagus may be modified by both oral antacid therapy and continuous antacid therapy. Continuous antacid intra-esophageal drip therapy is superior to oral antacid therapy in the treatment of the esophagitis.

2974 MANAGEMENT OF TRANSMURAL PEPTIC STRICTURES OF THE ESOPHAGUS. *(E.)* Rees, J. R.; Thorbjarnarson, B.; Barnes, W. A. (New York Hosp., N.Y.). *Ann. Surg.* 179(3):382-386, 1974.

2975 FOREIGN BODIES IN THE ESOPHAGUS: RADIOLOGICAL EXAMINATION AND ENDOSCOPY. *(Ger.)* Wenz, W.; Wiemers, K. (Inst. Radiol. Diagnosis, Univ. Freiburg, Germany). *Radiologe* 13(9):366-371, 1973.

2976 ANATOMICAL AND SURGICAL STUDY OF THE JUNCTION OF THE SPLENIC AND GASTROEPIPLOIC ARTERIES IN RELATION TO PROBLEMS OF VASCULARIZATION IN GAVRILIU'S NEOESOPHAGUS. (NOTE I). *(It.)* Nuzzo, G.; Asole, F.; Granone, P.; Picciocchi, A. (Sacred Heart Catholic Univ., Rome, Italy). *Policlinico (Chir.)* 79(5):241-254, 1972.

2977 CLINICAL FEATURES AND TREATMENT OF HIATUS HERNIA. *(Ger.)* Hohle, K. D.; Willebrand, H.; Fischer, D. (Surg. Clin., Univ. Mainz, Germany). *Bruns Beitr. Klin. Chir.* 220(6):565-570, 1973.

2978 THE AVOIDANCE OF ERRORS IN SURGICAL TECHNIQUE IN FUNDOPLICATION. *(Ger.)* Yasargil, E. C. (Bethesda Hosp., Basel, Switzerland). *Chirurg* 44(7):303-305, 1973.

2979 COMPLICATIONS OF INTRATHORACIC POSITION OF THE STOMACH IN NONMALIGNANT DISEASES OF THE ESOPHAGUS. *(Fr.)* Megevand, R.; Kalfopoulos, P.; Weber, M. (Surg. Clin., Univ. Geneva, Switzerland). *Helv. Chir. Acta* 41(1/2):115-119, 1974.

2980 PATHOLOGICAL ANATOMY OF THE ESOPHAGUS. *(Ger.)* Wanke, M. (Munic. Hosp., Rendsburg, Germany). *Radiologe* 13(9):351-360, 1973.

2981 RADIOLOGICAL FINDINGS IN ESOPHAGEAL CYSTS. *(Ger.)* Heuck, F. (Katharinen Hosp., Stuttgart, Germany). *Radiologe* 13(9):380-383, 1973.

2982 THE DIAGNOSIS OF IRRADIATED ESOPHAGEAL CARCINOMA. *(Ger.)* Klumper, A.; Fank, E.; Correll, G. (Inst. Radiol. Diagnosis, Univ. Freiburg, Germany). *Radiologe* 13(9):384-387, 1973.

2983 PRIMARY MALIGNANT MELANOMA OF THE ESOPHAGUS. *(E.)* Saibil, E.; Palayew, M. J. (Jewish Gen. Hosp., Montreal, Canada). *Am. J. Gastroenterol.* 61(1):63-67, 1974.

2984 SPONTANEOUS PERFORATION OF THE ESOPHAGUS ASSOCIATED WITH SMOOTH MUSCLE HYPERTROPHY. *(E.)* Katz, S. J.; Lieberman, A.; Hechtman, H. B. (Univ. Hosp., Boston, Mass.). *Am. J. Surg.* 127(3): 338-341, 1974.

2985 TOPICAL VASOPRESSIN IN THE MANAGEMENT OF NONVARICEAL BLEEDING FROM LESIONS IN THE ESOPHAGUS. *(E.)* Naitove, A.; Mikell, F. L.; Karl, R. C. (Dartmouth Med. Sch., Hanover, N.H.). *Am. J. Surg.* 127(4):382-386, 1974.

2986 THE APPARENT DISPARITY IN INCIDENCE OF HIATAL HERNIAE IN INFANTS AND CHILDREN IN BRITAIN AND THE UNITED STATES. *(E.)* Friedland, G. W.; Dodds, W. J.; Sunshine, P.; Zboralske, F. F. (Stanford Univ. Sch. Med., Calif.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 120(2):305-314, 1974.

2987 THE MOTOR DEFECT OF ESOPHAGITIS. *(E.)* Henderson, R. D.; Mugashe, F.; Jeejeebhoy, K. N.; Cullen, J.; Boszko, A.; Szczapanski, M.; Marryatt, G. (Toronto Gen. Hosp., Canada). *Can. J. Surg.* 17(2):112-116, 1974.

2988 ACUTE UPPER GASTROINTESTINAL TRACT BLEEDING AND RECENT ALCOHOL INGESTION. *(E.)* Watson, W. C.; Sallam, M.; Allan, G. (Victoria Hosp., London, Canada). *Can. Med. Assoc. J.* 110(5):525-529, 1974.

2989 DOES ALCOHOL FAVOR THE DEVELOPMENT OF BARRETT'S SYNDROME (ENDOBRACHYESOPHAGUS)?

(Ger.) Martini, G. A.; Wienbeck, M. (Med. Clin., Univ. Marburg, Germany). *Dtsch. Med. Wochenschr.* 99(10):434-439, 1974.

2990 OESOPHAGO-CARDIAC FISTULA COMPLICATING ACHALASIA. *(E.)* Strong, R. W. (Princess Alexandra Hosp., Brisbane, Australia). *Postgrad. Med. J.* 50:41-44, 1974.

2991 SURGICAL MANAGEMENT OF BENIGN ESOPHAGEAL STRICTURES. *(E.)* Strug, B. S.; Jordan, Jr., P. H.; Jordan, Jr., G. L. (Baylor Coll. Med., Houston, Tex.). *Surg. Gynecol. Obstet.* 138(1): 74-76, 1974.

2992 AUTOTRANSPLANTATION OF THE CANINE ESOPHAGUS. *(E.)* Lynch, V. P.; Schlegel, J. F.; Ellis, Jr., F. H. (Mayo Clin., Rochester, Minn.). *Surg. Gynecol. Obstet.* 138(3):396-400, 1974.

2993 EVALUATION OF SELECTIVE TRANSSPLENIC DECOMPRESSION OF GASTROESOPHAGEAL VARICES. *(E.)* Silver, D.; Puckett, C. L.; McNeer, J. F.; McLeod, M. E.; Sabiston, Jr., D. C. (Duke Univ. Med. Ctr., Durham, N.C.). *Am. J. Surg.* 127(1): 30-34, 1974.

2994 SIXTY-EIGHT CASES OF CANCER OF THE ESOPHAGUS. DIAGNOSIS AND TREATMENT. *(Fr.)* Bremen, J.; Lambilliotte, J. P.; Gerard, A.; Bremer, A. (St. Pierre Univ. Hosp., Brussels, Belgium). *Acta Gastroenterol. Belg.* 36:376-396, 1973.

See also 2917, 2925, 2929, 2949, 3230, 3237.

STOMACH

2995 CONTROL OF ACUTE GASTRIC MUCOSAL HEMORRHAGE. INTRA-ARTERIAL INFUSION OF POSTERIOR PITUITARY EXTRACT. *(E.)* Athanasoulis, C. A.; Baum, S.; Waltman, A. C.; Ring, E. J.; Imbembo, A.; Salm, T. J. V. (Massachusetts Gen. Hosp., Boston). *N. Engl. J. Med.* 290(11):597-603, 1974.

During a 23-month period, 50 patients with acute unremitting gastric mucosal hemorrhage underwent angiography. Posterior pituitary extract was selectively infused into the bleeding artery in 37 of these patients, and the hemorrhage was angiographically and clinically controlled in 31 (84%). Four of 6 patients whose bleeding was not controlled required an operation. The remaining 13 of the 50 patients were not infused with posterior pituitary extract, because in 8 of them, it was not technically feasible to catheterize the appropriate artery, and in 5, associated conditions precluded therapy. Ten of these 13 patients required an operation to arrest bleeding. Of the 31 patients whose hemorrhage was controlled with the intra-arterial infusion of posterior pituitary extract, rebleeding occurred in 2 -- in one, 7 days after the infusion and in the other 19 days after initial control and 4 days after a portacaval shunt. In no patient was it necessary to discontinue the infusion because of local or systemic complications.

2996 MALIGNANT GASTRINOMA FOLLOWING TOTAL GASTRECTOMY. *(E.)* Passaro, Jr., E.; Gordon, E. (VA Wadsworth Hosp. Ctr., Los Angeles, Calif.). *Arch. Surg.* 108(4):444-448, 1974.

Half of all patients with the Zollinger-Ellison syndrome treated by total gastrectomy will eventually die from their tumor. The clinical course of 4 patients observed for at least 4 yr is discussed. Three patients had liver metastases, responsible for the death of 2 and seriously affecting the third. The fourth had extensive tumor around the pancreas plus mesenteric metastases that were removed. The patient is doing well. Hepatic artery ligation, streptozotocin therapy, and internal radiation of the tumor were tried in an attempt to control the hepatic metastases. Hepatic scans, the serum gastrin response to calcium infusion, and hepatic angiography are useful techniques to assess continued tumor growth following total gastrectomy.

2997 THE INFLUENCE OF BILE ON CANINE GASTRIC SECRETION. *(E.)* Wickbom, G.; Ello, F.; Faith, M.; Woodward, E. R.; Landor, J. H. (Coll. Med., Univ. Florida, Gainesville). *J. Surg. Res.* 16(1):6-12, 1974.

The effect of various types of biliary diversion on the daily secretion of Heidenhain pouches in 18 mongrel dogs was studied. Total external diversion of bile brought about a decrease in gastric secretion while simple internal diversion of bile to the distal gut via Roux-en-Y segment caused significant increase in Heidenhain pouch secretion. The observed increases in secretion could not be accounted for on the basis of impairment of liver function as measured by serial BSP determinations.

2998 LEIOMYOBLASTOMA OF THE STOMACH. *(E.)* O'Brien, S. E.; Shier, K. J. (Dept. Surg., McMaster Univ., Hamilton, Canada). *Can. J. Surg.* 17(2):105-110, 1974.

2999 IMMUNOGLOBULIN-CONTAINING CELLS IN NORMAL GASTRIC MUCOSA AND IN PATIENTS WITH CHRONIC GASTRITIS. AN IMMUNOFLUORESCENCE STUDY OF 46 GASTRIC BIOPSIES. *(Fr.)* Camilleri, J. P.; Berault, J.; Picker, M.; Diebold, J. (Hotel Dieu, Paris, France). *Biol. Gastroenterol. (Paris)* 6(3):231-241, 1973.

3000 CYTOFLUORIOMETRIC STUDY OF THE DNA CONTENT IN GASTRIC CANCER CELLS. *(Rus.)* Matiushina, E. D.; Rapoport, S. I.; Zelenin, A. V. (All-Union Sci. Res. Inst. Gastroenterol., Moscow, USSR). *Vopr. Onkol.* 19(8):8-13, 1973.

3001 THE BEHAVIOR OF GASTRIC JUICE MUCOPROTEINS IN NORMAL SUBJECTS AND IN STOMACH DISEASE. (GASTRITIS, PEPTIC ULCER, STEROID GASTROPATHY). *(It.)* Corsini, P.; Mordini, M.; Bellofiore, P. (Grosseto Munic. Hosp., Italy). *Chir. Gastroenterol.* 7(1):11-16, 1973.

3002 CLINICAL TRIAL OF AGEL-BISMUTH FOR THE TREATMENT OF GASTRODUODENAL LESIONS. *(Sp.)* Guemes Diaz, F.; Conesa Pico, O.; Hidalgo, H.; Arias Vallejo, E. (Sch. Digestive Dis., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(7):841-852, 1973.

3003 ENDOSCOPIC FEATURES OF THE STOMACH IN PATIENTS SUBJECTED TO VAGOTOMY ASSOCIATED WITH PYLOROPLASTY FOR THE TREATMENT OF CHRONIC DUODENAL ULCER. *(Por.)* Whitaker, J. C. de C.; Meirelles, Jr., J. de S.; Chacon, J. P. (Sao Paulo Med. Sch., Brazil). *Arq. Gastroenterol.* 10(2):105-114, 1973.

3004 AUTORADIOGRAPHIC STUDIES ON THE MUCIN METABOLISM IN HUMAN GASTRIC MUCOSA WITH SPECIAL REFERENCE TO INTESTINAL METAPLASIA. *(E.)* Shimamoto, K.; Kawai, K.; Murakami, K.; Misaki, F.; Kohli, Y.; Yamashita, S.; Hattori, T.; Fujita, S. (Kyoto Pref. Univ. Med., Japan). *Acta Hepatogastroenterol.* 20(6):490-499, 1973.

3005 GIANT FOLLICULAR LYMPHOMA OF THE STOMACH: REPORT OF 4 CASES. *(E.)* Akagi, T.; Okajima, K.; Fujii, Y.; Ishikawa, M. (Okayama Univ. Med. Sch., Japan). *Acta Pathol. Jap.* 23(2):397-405, 1973.

3006 LYMPHOMATOUS INVOLVEMENT OF THE STOMACH DEMONSTRATED BY GALLIUM-67 SCANNING. *(E.)* Que, L.; McCartney, W.; Hankins, A.; Hoffer, P. (Pritzker Sch. Med., Chicago, Ill.). *Am. J. Dig. Dis.* 19(3):271-274, 1974.

3007 A GASTRIC CARCINOID TUMOR WITH MASSIVE BLEEDING. *(E.)* Honig, L. J.; Weingarten, G. (Lenox Hill Hosp., New York, N.Y.). *Am. J. Gastroenterol.* 61(1):40-44, 1974.

3008 OBSERVATIONS ON THE ETIOLOGICAL RELATIONSHIP OF ACHYLIA GASTRICA TO PERNICIOUS ANEMIA. I. THE EFFECT OF THE ADMINISTRATION TO PATIENTS WITH PERNICIOUS ANEMIA OF THE CONTENTS OF THE NORMAL HUMAN STOMACH RECOVERED AFTER THE INGESTION OF BEEF MUSCLE. *(E.)* Castle, W. B. (Harvard Med. Sch., Boston, Mass.). *Am. J. Med. Sci.* 267(1):2-14, 1974.

3009 OBSERVATIONS ON THE ETIOLOGIC RELATIONSHIP OF ACHYLIA GASTRICA TO PERNICIOUS ANEMIA. II. THE EFFECT OF THE ADMINISTRATION TO PATIENTS WITH PERNICIOUS ANEMIA OF BEEF MUSCLE AFTER INCUBATION WITH NORMAL HUMAN GASTRIC JUICE. *(E.)* Castle, W. B.; Townsend, W. C. (Harvard Med. Sch., Boston, Mass.). *Am. J. Med. Sci.* 267(1):15-24, 1974.

3010 ACHYLIA GASTRICA IN RETROSPECT. *(E.)* Castle, W. B. (Harvard Med. Sch., Boston, Mass.). *Am. J. Med. Sci.* 267(1):25-29, 1974.

3011 GASTRIC METASTASES FROM BREAST CARCINOMA. *(E.)* Appel, M. F. (Kelsey-Seybold Clin., Houston, Tex.). *Am. Surg.* 40(4):253-255, 1974.

3012 POASTGASTRECTOMY GASTRITIS, ENDOSCOPIC, HISTOPATHOLOGIC, AND IMMUNOLOGIC FEATURES. (EXPERIMENTAL STUDY IN DOGS). *(Por.)* Vieira, O. M.; Lima, A. O.; Machado, G.; Rubens, J.; Gomes, L. A. S.; de Andrade, M. (Fac. Med., Federal Univ., Rio de Janeiro, Brazil). *Arq. Gastroenterol.* 10(4):235-243, 1973.

3013 MENETRIER'S DISEASE. DIAGNOSIS (BY DETERMINING PROTEIN LOSS WITH ^{51}Cr ALBUMIN) AND TREATMENT. COURSE AFTER VAGOTOMY. ONE CASE REPORT. *(Por.)* Bartolomucci, A. C.; Hashimoto, T.; Attie, Jr., M.; Speranzini, M. B.; Reis Lopes, E. (Sch. Med. Surg., Uberlandia, Brazil). *Arq. Gastroenterol.* 10(4):267-278, 1973.

3014 X-RAY CHANGES IN THE MORPHOLOGY AND FUNCTION OF THE PYLORUS FOLLOWING VAGOTOMY AND DRAINAGE OPERATIONS. *(Ger.)* Lechner, G.; Reidl, P.; Dinstl, K. (1st Surg. Clin., Univ. Vienna, Austria). *Bruns Beitr. Klin. Chir.* 220(4):405-412, 1973.

3015 EARLY GASTRIC CARCINOMA AFTER BILLROTH II RESECTION. *(Ger.)* Rehner, M.; Soehendra, N.; Eichfuss, H. P.; Dahm, K.; Eckert, P.; Mitschke, H. (Surg. Clin., Univ. Hamburg, Germany). *Dtsch. Med. Wochenschr.* 99(11):533-534, 1974.

3016 THE ABSORPTION OF ASPIRIN AND PARACETAMOL IN PATIENTS WITH ACHLORHYDRIA. *(E.)* Pottage, A.; Nimmo, J.; Prescott, L. F. (Royal Infirm. Edinburgh, Scotland). *J. Pharm. Pharmacol.* 26(2):144-145, 1974.

3017 STOMACH CANCER AFTER SURGERY FOR PEPTIC ULCER. *(Fr.)* Gazzola, L.; Saegesser, F.

(Dept. Surg., Univ. Lausanne, Switzerland). *Praxis* 62(34):1040-1044, 1973.

3018 A GASTRIC NEOPLASM TEN YEARS AFTER ITS DIAGNOSIS. *(Sp.)* Dominguez Rodino y de-Adame, E.; Dominguez, J.; de Adame. (no affil.). *Rev. Esp. Enferm. Apar. Dig.* 41(5):591-598, 1973.

3019 GASTRIC DIVERTICULA. COMMENTS ON ONE CASE LOCATED IN THE ANTRUM. *(Sp.)* Rodriguez Cuartero, A.; Urbano Jimenez, F. (Fac. Med., Univ. Granada, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(8):923-934, 1973.

3020 RELEVANCE OF GASTROINTESTINAL SYMPTOMS AND BLOOD LOSS AFTER LONG TERM TREATMENT WITH SALICYLATE-PARACETAMOL ESTER, A NEW ANTI-INFLAMMATORY AGENT (BENORYLATE). *(E.)* Reizenstein, P.; Doberl, A. (no affil.). *Rheumatol. Rehabil.* (suppl. 1973):66-71, 1973.

3021 ORGANO-AXIAL VOLVULUS OF THE STOMACH WITH EVENTRATION OF THE DIAPHRAGM. *(E.)* Davis, R. (Baragwanath Hosp., Johannesburg, South Africa). *S. Afr. Med. J.* 47(48):2342-2346, 1973.

See also 2713, 2930, 2933, 2958, 2967, 2968, 2969, 2988, 3024, 3034, 3035, 3054, 3113, 3317.

STOMACH

Peptic Ulcers

3022 SUPPRESSION OF BETAZOLE-INDUCED DUODENAL ULCERATION IN GUINEA PIGS BY ANTACIDS AND PROPANTHELINE BROMIDE. *(E.)* Ridley, P. T.; Klaiber, M. S.; Eagleton, G. B.; Schlosser, J. H.; Groves, W. G. (Smith Kline, French Labs., Philadelphia, Pa.). *Res. Commun. Chem. Pathol. Pharmacol.* 7(3):583-592, 1974.

A method is described for the production of duodenal ulcers in guinea pigs by the administration of betazole HCl. Only those male albino guinea pigs with a gastric hydrogen ion concentration of more than 130 mEq/L in response to a 50 mg/kg challenge dose of betazole HCl were selected for the ulcer test. Animals in control and treatment groups were injected with 50 mg/kg of betazole HCl, i.m. Food was withheld and water allowed *ad libitum* for 24 hours after which all animals were again administered betazole HCl at the dose level of 50 mg/kg i.m. Propantheline bromide (PB-Br), magnesium-aluminum hydroxide gel (MA), and a concentrated liquid antacid (CLA), were administered at the time of each betazole administration. PB-Br in saline was given s.c. at 16, 8, 4, and 2 mg/kg. Controls received only saline. MA was given orally at the doses of 8, 4, 2, 1, and 0.5 ml/kg. CLA doses were 2, 1, 0.5, and 0.25 ml/kg. A total number of 343 guinea pigs were found with duodenal ulceration. The ulcer incidence ranged from 70 to 100% with a median of 90 and overall mean of 91%. In the placebo group, 55% had superficial erosions, 39% had deep and 6% had perforating ulcers. Both antacid preparations produced dose-related inhibition of duodenal ulceration. PB-Br, at very high doses, produced a dose-related suppression of duodenal lesions. It is concluded that this method offers an approach to study the etiology of mucosal ulceration and to the discovery of novel therapeutic agents that enhance mucosal resistance.

3023 EFFECT OF CALCITONIN ON GASTRIC AND PANCREATIC SECRETION AND PEPTIC ULCER FORMATION IN CATS. *(E.)* Konturek, S. J.; Radecki, T.; Konturek, D.; Dimitrescu, T. (Med. Acad., Krakow, Poland). *Am. J. Dig. Dis.* 19(3):235-241, 1974.

In conscious cats with chronic gastric fistula and the diversion of bile and pancreatic juice to the jejunum, calcitonin (5 U/kg-hr) caused a marked inhibition of near maximal gastric acid response to pentagastrin and to histamine. In cats with chronic pancreatic fistula, calcitonin inhibited near maximal pancreatic response to exogenous secretin, caerulein, and duodenal acidification. Calcitonin prevented the formation of duodenal ulcers in cats infused with pentagastrin and histamine for 36 hours. The antiulcer action of calcitonin can be attributed mainly to its inhibitory action on gastric acid secretion.

3024 LONG-TERM RESULTS OF SURGICAL TREATMENT FOR DUMPING AFTER PARTIAL GASTRECTOMY. *(E.)* Eldh, J.; Kewenter, J.; Kock, N. G.; Olson, P. (Sahlgren's Hosp., Univ. Goteborg, Sweden). *Br. J. Surg.* 61(2):90-93, 1974.

There were 47 patients with moderate or severe dumping after partial gastric resection who were observed for 8 yr. Twenty patients had been treated for dumping by conversion of the gastrojejunostomy to gastroduodenostomy and in 14 patients an isoperistaltic segment of jejunum had been interposed between the gastric remnant and the duodenum. Thirteen patients with postgastrectomy dumping had not been operated upon secondarily and served as controls. About 50% of the patients who were surgically treated for dumping improved during the observation time. In the group of patients treated conservatively for dumping, improvement was recorded in approximately 60%. The finding of frequent socio-psychiatric manifestations in patients with postgastrectomy dumping emphasizes the importance of considering the mental conditions when selecting patients for gastric surgery. The high proportion of patients who improved spontaneously in the control group also stresses the importance of delaying surgical treatment for a time in patients with postgastrectomy dumping.

3025 INHIBITION OF GASTRIN RELEASE AND GASTRIC SECRETION BY CALCITONIN IN PATIENTS WITH PEPTIC ULCER. *(E.)* Becker, H. D.; Reeder, D. D.; Scurry, M. T.; Thompson, J. C. (Univ. Texas Med. Branch, Galveston). *Am. J. Surg.* 127(1):71-75, 1974.

The effect of an i.v. infusion of calcitonin (2 MRCU/kg) on gastric secretion and serum gastrin and serum calcium levels was studied in 8 normal subjects, 6 patients with duodenal ulcer disease, 3 patients with primary hyperparathyroidism, 6 patients with histologically proved Zollinger-Ellison syndrome, and 3 patients with the Zollinger-Ellison syndrome and hyperparathyroidism. Gastric secretion was greatly inhibited in all groups of patients. Serum calcium was significantly diminished only in patients with hypercalcemia. Serum gastrin levels were depressed in all patients with elevated basal gastrin levels. In normal subjects calcitonin strongly inhibited the serum gastrin response to food. These findings suggest that calcitonin may have a regulatory function in the release or catabolism of the hormone gastrin.

3026 EFFECT OF CARBENOXOLONE ON IONIC FLUXES ACROSS NORMAL GASTRIC MUCOSA AND THAT ASSOCIATED WITH GASTRIC ULCER. *(E.)* Ivey, K. J.; Gray, C. (Roy. Prince Alfred Hosp., Camperdown, Australia). *Aust. N.Z. J. Surg.* 3(5):451-456, 1973.

The effect of carbenoxolone on ionic permeability of human gastric mucosa was determined using liquid test meals in 5 healthy subjects. Control solutions contained 160 mM HCl and 25 μc/liter $^{51}CrCl_3$ as nonabsorbable indicator. The test solution contained in addition 100 mg carbenoxolone per 200 ml. No significant differences were found in net H^+, Na^+, K^+, or Cl^- fluxes between control and carbenoxolone studies. In 3 subjects, studies were repeated after 3 weeks of oral therapy with carbenoxolone tablets, 100 mg 3 times a day. This produced no significant alteration of values either in control or carbenoxolone studies. A 24-yr-old patient with a markedly abnormal gastric mucosal barrier was studied during the acute phase of his ulcer and again after radiological healing of the ulcer following 3 months of therapy with carbenoxolone, 100 mg 3 times a day. Ionic permeability of the mucosa remained unaltered despite healing of the ulcer and/or carbenoxolone therapy. When the ulcer recurred, intragastric instillation of the carbenoxolone test solution failed to alter ionic permeability. It is concluded that carbenoxolone does not alter ionic permeability in normal subjects nor does its action in increasing the healing rate of gastric ulcer appear to be due to alteration of ionic permeability.

3027 THE EFFECT OF RED PEPPER (Capsicum frutescens) ON GASTRIC ACID SECRETION. *(E.)* Solanke, T. F. (no affil.). *J. Surg. Res.* 15(6): 385-390, 1973.

The effect of red pepper suspension on gastric acid secretion was studied in 37 patients with proven duodenal ulcer and 44 patients with nonduodenal ulcer disease. Two forms of the red pepper suspension were used: an ordinary red pepper suspension (A), and a suspension with pH adjusted to 7.4 (B). The patients were divided into Groups (A) and (B). Each group had both duodenal and nonduodenal patients. Distilled water was used as a control in each patient. The instillation of the suspension through a nasogastric tube eliminated the burning effect of the red pepper suspension and the admixture of saliva with the test suspension. There was a significant increase in gastric acid secretion after treatment with red pepper in both groups of patients, more especially in duodenal ulcer patients. The results of this study support the idea that the consumption of red pepper leads to increased gastric acid production which may aggravate the symptoms of duodenal ulceration.

3028 INHIBITION OF GASTRIC PLASMIN ACTIVITY BY EPSILON-AMINOCAPROIC ACID. *(E.)* Thomson, J. M.; Turner, L.; Poller, L. (Withington Hosp., South Manchester, England). *Ann. R. Coll. Surg. Engl.* 53(6):340-347, 1973.

Preoperative administration of the antifibrinolytic drug ε-aminocaproic acid prevented the release of plasmin activity following digital compression of the stomach at operation in 13 out of 14 patients with duodenal ulceration. The inhibition of plasmin activity was more effective in patients who received 3 p.o. doses of 0.1 g/kg ε-aminocaproic acid at 6-hr intervals up to 8 hr before operation than in those who received 2 doses, with the final dose given 2-3 hr before operation. In a parallel control series, all of 15 duodenal ulcer patients not given ε-aminocaproic acid showed evidence of plasmin in gastric and peripheral venous blood and of fibrin/fibrinogen breakdown in these same blood samples following similar gastric manipulation. The ε-aminocaproic treated series, apart from 1 patient with pyloric stenosis, showed an increase of plasminogen activator only, presumably due to stress, anesthesia, etc., and no increase of fibrin/fibrinogen breakdown products. Antifibrinolytic drugs may become an important new factor in the management of bleeding from acute gastric erosions.

3029 TRIALS WITH GAVISCON: ITS MODE OF ACTION AND ITS USE IN THE TREATMENT OF DUODENAL ULCERS (A DOUBLE-BLIND TRIAL). *(E.)* Moshal, M. G. (King Edward VIII Hosp., Durban, South Africa). *S. Afr. J. Surg.* 11(3):139-144, 1973.

The *in vivo* and *in vitro* antacid properties and the floating action of Gaviscon were studied. The *in vivo* antacid properties were studied in 6 intubated subjects with the tip of a nasogastric tube in the antrum of the stomach. Two tablets of Gaviscon or placebo were chewed in random fashion in a double-blind trial. An i.m. injection of 6 μg/kg pentagastrin was administered simultaneously. In the first 15 min of collection (begun 20 min after injection), the percent reduction in total acid concentration was 37.3, or lower than for the 2nd sample. On the 2nd day of Gaviscon administration, the percentage reduction in the 1st sample was 43.9. The mean reduction in acid output was 47.8%. The pH of basal and stimulated gastric juice was measured in 6 subjects. Two powdered Gaviscon tablets were added to 10, 20, 30, 40, or 50 ml gastric juice, and the test tube was shaken. In basal gastric juice, the mean initial pH of 1.9 rose to 4.0 when 10 ml of gastric juice was used and to 3.75 with 20 ml. Withdrawal of gastric juice from a patient after ingestion of Gaviscon showed that the Gaviscon floats atop the secretion. The clinical effectiveness of Gaviscon in acute exacerbation of duodenal ulceration was tested in a double-blind random fashion with 54 courses of treatment. Each patient was subjected to duodenoscopy and barium meal before and after a 4-week course of Gaviscon or placebo. The tablets were identical and 2 were chewed with meals and at bedtime. The 22 patients receiving Gaviscon had a satisfactory cure; 13 patients failed to heal. The duodenal ulcers of 6 patients on placebo healed at 4 weeks; 13 failed to heal.

3030 TOLBUTAMIDE VERSUS INSULIN AS TEST AGENTS IN VAGOTOMY-PYLOROPLASTY PATIENTS, A LONG-TERM STUDY. *(E.)* Stempien, S. J.; Lee, E. R.; Dagradi, A. E. (Long Beach VA Hosp., Calif.). *Am. J. Gastroenterol.* 61(1):22-27, 1974.

3031 A CONTROLLED TRIAL OF ANTACID, PROPANTHELINE AND AMYLOPECTIN SULFATE IN DUODENAL ULCER. *(E.)* Sun, D. C. H. (Phoenix VA Hosp. Ariz.). *Am. J. Gastroenterol.* 60(5):449-458, 1973.

3032 VAGOTOMY AND DRAINAGE FOR OBSTRUCTING DUODENAL ULCERS. IMPORTANCE OF ADEQUATE DRAINAGE. *(E.)* DeMatteis, R. A.; Hermann, R. E. (Cleveland Clin. Fdn., Ohio). *Am. J. Surg.* 127(3): 237-240, 1974.

3033 RECURRENT DUODENAL ULCER DISEASE. *(E.)* Ahmad, W.; Harbrecht, P. J.; (Univ. Louisville Sch. Med., Ky.). *Arch. Surg.* 108(4):428-433, 1974.

3034 PARIETAL CELL VAGOTOMY WITHOUT DRAINAGE. EARLY EVALUATION OF RESULTS IN THE TREATMENT OF DUODENAL ULCER. *(E.)* Jordan, Jr., P. H. (Baylor Coll. Med., Houston, Tex.). *Arch. Surg.* 108(4):434-441, 1974.

3035 SUPERFICIAL CHRONIC GASTRITIS IN PATIENTS WITH DUODENAL ULCER. *(Por.)* de Moraes, Jr. J. P. P.; Lins, G. G. S. A.; Bettarello, A. (Univ. Coll. Hosp. Med. Sch., London, England). *Arq. Gastroenterol.* 10(4):245-250, 1973.

3036 EARLY AND LATE RESULTS FROM SURGICAL TREATMENT OF JEJUNAL PEPTIC ULCER. *(Ger.)* Sailer, R.; Schacht, U.; Junemann, A. (Surg. Clin., Univ. Dusseldorf, Germany). *Bruns Beitr. Klin. Chir.* 220(5):461-466, 1973.

3037 GASTRIC ULCER AND BRONCHIAL CARCINOMA. *(Ger.)* Kohout, J. (Wilhelminespital, Vienna, Austria). *Oesterreich. Z. Erforsch. Bekaempfung Krebskr.* 28(5/6):211-228, 1973.

3038 PSYCHODYNAMICS OF ULCER PATIENTS BASED ON THE GIESSEN TEST. *(Ger.)* Overbeck, G. (no affil.). *Psychother. Psychosom.* 24(1):1-17, 1974.

3039 BLOOD GLUCOSE AND INSULIN LEVELS AFTER ORAL GLUCOSE LOADING IN DUODENAL ULCER PATIENTS. THEIR RELATIONS WITH GASTRIC SECRETION. *(Sp.)* Castro, J.; Maranon, A.; Duran, S.; Romero, E. (Fac. Med., Valladolid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(5):583-590, 1973.

3040 THE COURSE OF PEPTIC ULCER IN CHILDREN. *(Sp.)* De Arzua Zulaica, E. (no affil.). *Rev. Esp. Enferm. Apar. Dig.* 41(8):887-898, 1973.

3041 DIGESTION AND ABSORPTION IN THE DUODENUM IN RELATION TO GASTRIC EMPTYING IN A PATIENT WITH DUODENAL ULCER: METHODOLOGICAL AND PHYSIOLOGICAL CONSIDERATIONS. *(E.)* Moberg, S.; Carlberger, G.; Barany, F. (St. Erik's Hosp., Stockholm, Sweden). *Scand. J. Gastroenterol.* 9(1): 9-15, 1974.

3042 DIGESTION AND ABSORPTION IN THE DUODENUM IN RELATION TO GASTRIC EMPTYING IN PATIENTS WITH PEPTIC ULCER BEFORE AND AFTER PARTIAL GASTRECTOMY OR SELECTIVE PROXIMAL VAGOTOMY. *(E.)* Moberg, S.; Carlberger, G.; Barany, F. (St. Erik's Hosp., Stockholm, Sweden). *Scand. J. Gastroenterol.* 9(1): 23-28, 1974.

3043 JEJUNAL TRANSPOSITION IN TREATMENT OF POST-GASTRECTOMY SYNDROMES. *(E.)* Nygaard, K.; Fretheim, B. (Rikshosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(1):59-64, 1974.

3044 METHYLURACIL TREATMENT OF PATIENTS WITH PEPTIC ULCER. *(Rus.)* Agapova, E. N.; Krutovskaia, O. V.; Afaunova, V. I.; Nikolaeva, S. A. (Kuban Med. Inst., Krasnodar, USSR). *Vrach. Delo* (1):74-76, 1974.

3045 CLINICAL CHARACTERISTICS OF ULCERS IN THE GASTRIC CARDIA. *(Rus.)* Pechatnikova, E. A.; Karpov, P. F. (10th Munic. Clin. Hosp., Dnepropetrovsk, USSR). *Vrach. Delo* (1):76-80, 1974.

3046 DISTURBANCES OF CHOLINERGIC AND ENERGY PROCESSES IN THE BODY DURING GASTRIC ULCEROGENESIS FOLLOWING HISTAMINE ADMINISTRATION. *(Rus.)* Tkach, Iu. I. (Dnepropetrovsk Sci. Res. Inst. Gastroenterol., USSR). *Vrach. Delo* (2):74-77, 1974.

3047 GASTRODUODENOSTOMY (JABOULAY PROCEDURE) AND TRUNCAL VAGOTOMY IN THE MANAGEMENT OF DUODENAL ULCER. *(E.)* Hurwitz, A.; Egozi, I.; Sarduy, P. (Mt. Sinai Med. Ctr., Miami Beach, Fla.). *S. Med. J.* 66(11):1244-1246, 1973.

3048 LONG-TERM CLINICAL FOLLOW-UP 11-20 YEARS AFTER BILLROTH I GASTROENTEROSTOMY FOR PEPTIC ULCER. PART I. *(Ger.)* Kaiser, C.; Zanoni, G.; Eglin, R. E. (Cantonal Hosp., Liestal, Switzerland). *Helv. Chir. Acta* 41(1/2):125-129, 1974.

3049 SELECTIVE VAGOTOMY AND PYLOROPLASTY FOR DUODENAL ULCER: LONG-TERM RESULTS. *(Sp.)* de Miguel, J. (no affil.). *Rev. Esp. Enferm. Apar. Dig.* 41(5):539-554, 1973.

3050 OCCURRENCE OF GASTRIC AND DUODENAL ULCER AMONG SEAMEN OF THE POLISH MERCHANT MARINE. *(E.)* Krynicki, A. (Inst. Marine Med., Gdansk, Poland). *Biul. Inst. Med. Morskiey Gdansku* 24(3/4):253-263, 1973.

See also 2708, 2712, 2713, 2926, 2931, 2933, 2996, 3001, 3012, 3017, 3263, 3342.

SMALL INTESTINE

3051 CARCINOID TUMORS OF THE GASTROINTESTINAL TRACT. *(E.)* Swensen, S. R.; Snow, E.; Gaisford, W. D. (Latter-day Saints Hosp., Salt Lake City, Utah). *Am. J. Surg.* 126(6):818-822, 1973.

A group of 56 patients (over 2/3rds of whom were females, aged 14-86 yr) underwent treatment for carcinoid tumor of the gastrointestinal tract. Presenting symptoms varied with the location of the tumor. The most common symptom was abdominal pain (25 patients), other symptoms included diarrhea (9), facial flushing (7), nausea and vomiting (3), gastrointestinal bleeding (7), weight loss (5), and abdominal distention (4). The primary location was the ileum (25). Other primary sites included the appendix, rectum, stomach, duodenum, jejunum, and colon. None of the tumors were benign; 80% had distant metastases or local invasion of carcinoid cells, suggesting that carcinoid tumors are aggressive neoplasms with slow but gradual extension into the mucosa and muscularis with eventual lymphatic and hematologic metastasis. Surgical treatment was used in 52 cases. Of the patients with tumor in the ileum, 23 underwent segmental bowel resection and biopsy or resection of metastases. Indications for surgery in the 17 patients with appendiceal carcinoid tumors included signs of localized peritonites and small bowel obstruction. Treatment of metastatic disease consisted of ileo-right colectomy. Simple appendectomy was used for tumors localized in the appendix. Of the 6 with carcinoid tumors of the rectum, 5 underwent excision and 1, abdominoperineal resection. Of the 3 with carcinoid tumors of the colon, treatment consisted of segmental resection, and all died within 15 months. The carcinoid syndrome was evident in 8 patients, for whom treatment consisted of alpha-methyl-dopa, methylsergide, 5-fluorouracil, cyclophosphamide, and analgesic medications. Of the 8, 7 died, but one is alive with the disease 7 yr later. Except in patients with rectal carcinoid or with carcinoid syndrome with elevated urinary levels of 5-hydroxyindole-acetic acid, preoperative diagnosis is rare. The treatment of choice for all carcinoid tumors is surgical appendectomy for appendiceal tumors, right hemicolectomy with patients with large tumors at the appendiceal base or with cecal extension, and excision for tumors smaller than 1.0 cm in the small and large bowel and smaller than 2.0 in the rectum. All 29 patients with localized lesions (excluding 4 postoperative deaths), have thus far survived from 1 to 17 yr.

3052 RADIOISOTOPE DIAGNOSIS OF A MECKEL'S DIVERTICULUM CAUSING INTESTINAL BLEEDING. *(E.)* Keramidas, D. C.; Voyatzis, N. (Aglaias Kyriakou Children's Hosp., Athens, Greece). *Z. Kinderchir.* 13(2):210-212, 1973.

A 5-yr-old boy with a history of bloody stools was subjected to an abdominal scan with ^{99m}Tc-pertechnetate. The stomach shadow and an abnormal uptake in the midabdomen below the gastric shadow were revealed. During subsequent surgery a Meckel's diverticulum was found and resected. An experimental scintogram of the abdomen with the same technique failed to visualize a known Meckel's diverticulum in a 6-yr-old boy without rectal bleeding, although three other cases were preoperatively diagnosed using this method. Thus abdominal scintigram, which is based on the affinity of the radionucleotide for the parietal cells of the gastric mucosa, is valuable but not absolute. Clinical and laboratory studies must be combined with the findings of the scintigram to assure correct diagnosis.

3053 INTRAMURAL HEMATOMA OF THE DUODENUM. *(E.)* Schonk, J. W. M. (Surg. Dept. Maas Zickenhuis, Boxmeer, Netherlands). *Arch. Chir. Neerl.* 26(1):87-90, 1974.

3054 PERSONAL EXPERIENCE IN THE MANAGEMENT OF 207 CASES OF GASTRODUODENAL HEMORRHAGE. *(It.)* Redulla, G.; Vassallo, P.; Banna, P.; Viola, S. (Dept. Gen. Clin. Surg., Univ. Catania, Calif.). *Minerva Chir.* 28(13/14):1001-1008, 1973.

3055 PREVENTION OF POSTOPERATIVE INTESTINAL FISTULAS: AN ANIMAL MODEL. *(Ger.)* Meyer, J. (Cantonal Hosp., Zurich, Switzerland). *Helv. Chir. Acta* 41(1/2):45-49, 1974.

3056 INTRAMURAL HAEMATOMA OF THE DUODENUM. *(E.)* Davis, R. (Baragwanath Hosp., Johannesburg, South Africa). *S. Afr. Med. J.* 47(43):2055-2056, 1973.

3057 CARCINOID OF THE DUODENUM. *(E.)* Sellars, J. R.; Caldwell, F. T. (Univ. Arkansas Med. Ctr., Little Rock). *S. Med. J.* 67(3):307-309, 1974.

3058 MALIGNANT TUMORS OF THE SMALL INTESTINE WITH EMPHASIS ON CARCINOID TUMORS. *(Fr.)* Nicole, A. (Inst. Pathol. Anat., Univ. Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 104(15):528-533, 1974.

3059 TWO CASES OF INTESTINAL OBSTRUCTIONS IN NEWBORNS (LEDD'S SYNDROME). *(Ukr.)* Berezhnyi, V. I. (Chernovtsy Med. Inst., USSR). *Pediatr. Akush. Ginekol.* 35(5):30-31, 1973.

3060 MANAGEMENT OF COMPLICATIONS FOLLOWING INTESTINAL BYPASS FOR MORBID OBESITY. *(E.)* Starkloff, G. B.; Wolfe, B. M.; Ramach, K. R. (St. Louis Univ. Sch. Med., Mo.). *Mo. Med.* 71(3):119-121, 1974.

3061 SURGICAL TREATMENT OF SEVERE OBESITY. I. PROSPECTS, LIMITS, AND RESULTS FROM INTESTINAL SURGERY. *(It.)* Doldi, S. B.; Donati, L.; Klinger, R.; Mori, G.; Montorsi, W. (Inst. Surg. Symptomatol., Univ. Milan, Italy). *Minerva Chir.* 28(12):905-917, 1973.

3062 ILEUS ASSOCIATED WITH ANTICOAGULANT THERAPY. *(Ger.)* Schroder, H. J. (Gen. Hosp. Altona, Hamburg, Germany). *Chirurg* 44(7):329-332, 1973.

3063 CIRCUMSCRIBED PRIMARY CARCINOMA IN THE UPPER JEJUNUM. *(Ger.)* Stolze, T. (2nd Med. Clin., Univ. Dusseldorf, Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 120(2):239-241, 1974.

3064 CONTINENT ILEOSTOMIES: RESULTS IN 90 PATIENTS. *(Ger.)* Kock, N. G. (Sahlgrenska Hosp., Goteborg, Sweden). *Helv. Chir. Acta* 41(1/2):171-174, 1974.

3065 PERFORATION OF A DUODENAL DIVERTICULUM. *(Ger.)* Dippon, R. (Cantonal Hosp., Aarau, Switzerland). *Helv. Chir. Acta* 41(1/2):121-122, 1974.

3066 PERFORATION OF THE SMALL INTESTINE. *(Ger.)* Shamiyeh, F. (Barmherzige Schwester Gen. Public Hosp., Linz, Austria). *Leber Magen Darm* 3(3):138-140, 1973.

3067 MASSIVE BLEEDING FROM THE SMALL BOWEL. *(E.)* Koncan, O.; Zakelj, V.; Abramic, P. (Surg. Clin., Ljubljana, Yugoslavia). *J. Abdom. Surg.* 16(3):63, 67-70, 1974.

3068 SEVERE INTESTINAL HAEMORRHAGE IN TYPHOID: A CASE REPORT. *(E.)* Holmgren, G. (Harare Central Hosp., Salisbury, Rhodesia). *Cent. Afr. J. Med.* 19(12):267-269, 1973.

3069 BENIGN PARAGANGLIOMA OF THE DUODENUM. CASE REPORT WITH LIGHT AND ELECTRON MICROSCOPIC EXAMINATION. *(E.)* Qizilbash, A. H. (Henderson Gen. Hosp., Hamilton, Canada). *Arch. Pathol.* 96(4):276-280, 1973.

3070 EXUDATIVE ENTEROPATHIES OF LYMPHATIC ORIGIN. PART 2. ETIOLOGICAL ASPECTS AND THERAPEUTIC CONCEPTS. *(Fr.)* Fortas, L.; Frexinos, J. (Purpan Hosp., Toulouse, France). *Arch. Fr. Mal. App. Dig.* 62(8):685-696, 1973.

3071 LOOP ILEOSTOMY AND COLOSTOMY FOR FAECAL DIVERSION. *(E.)* Alexander-Williams, J. (Gen. Hosp., Birmingham, England). *Ann. R. Coll. Surg. Engl.* 54(3):141-148, 1974.

See also 2918, 2934, 2945, 2952, 2953, 2968, 3002, 3106, 3170, 3197, 3245, 3276, 3278, 3286, 3301, 3352.

SMALL INTESTINE

Malabsorption

3072 AMINO ACID AND PEPTIDE ABSORPTION IN PATIENTS WITH COELIAC DISEASE AND DERMATITIS HERPETIFORMIS. *(E.)* Silk, D. B. A.; Kumar, P. J.; Perrett, D.; Clark, M. L.; Dawson, A. M. (St. Bartholomew's Hosp., London, England). *Gut* 15(1):1-8, 1974.

A double-lumen perfusion technique was used to study amino acid and peptide absorption in 8 normal subjects, 13 patients with untreated adult celiac disease, and 16 patients with dermatitis herpetiformis who had varying morphological abnormalities of the small bowel. All subjects were perfused with isotonic solutions containing 10 mM glycyl-L-alanine and 10 mM glycine + 10 mM L-alanine. The patients with adult celiac disease had significantly impaired absorption of glycine and L-alanine from the amino acid solution as compared with the control subjects. Amino acid uptake from the dipeptide solution was not significantly impaired, although 4 individual patients showed impaired uptake of both amino acids. In contrast, very few patients with dermatitis herpetiformis showed impaired amino acid absorption from either solution. Sodium absorption from both solutions was impaired when the patients with adult celiac disease and dermatitis herpetiformis with subtotal villous atrophy and partial villous atrophy were studied, and there were patients in each group who secreted sodium and water. The results suggest that the malabsorption of dietary protein is unlikely to occur in dermatitis herpetiformis, but that it may occur and contribute to the protein deficiency seen in some severe cases of adult celiac disease. The impairment of sodium and water absorption provides evidence that there may be functional impairment of the jejunal mucosa in dermatitis herpetiformis as well as in adult celiac disease.

3073 ROLE OF BILE SALTS IN FAT MALABSORPTION OF PREMATURE INFANTS. *(E.)*

Signer, E. Murphy, G. M.; Edkins, S.; Anderson, C. M. (Inst. Child Health, Univ. Birmingham, England). *Arch. Dis. Child.* 49(3): 174-180, 1974.

Nine premature infants were fed a diet of human milk, while nine others were fed modified cow's milk. Subsequent to a 72-hr fat balance, a duodenal intubation was performed on the 14th day of life. Total bile acids were determined in serial duodenal aspirates before and after a milk feed. The excretion of bile acid in the feces was measured over a 72 hr period. The infants fed with human milk absorbed fat better (mean fat absorption coefficient 75%) than those receiving the cow's milk formula (mean fat absorption coefficient 60%). In both groups, bile acid concentrations after a meal were often less than that required for the formation of micellar solutions and the solubilization of fat. With human milk, a reasonable fat absorption occurred even with bile acid levels below the critical micellar concentration. In the infants fed the cow's milk formula, impaired fat absorption was correlated with low bile acid levels. The infants fed human milk excreted less bile acids in the stool than did the infants fed the cow's milk formula. In both groups, the fecal loss of bile acids was increased compared with that in older infants and children. The nutrition of newborn premature infants must take into account the bile salt deficiency present in these babies. Human milk or commercially prepared formulas with a fat composition similar to that of human milk should be used. Supplementation of the diet with vitamins A, D, and E is highly desirable.

3074 QUANTITATION OF THE HISTOLOGICAL CHANGES FOUND IN SMALL INTESTINAL BIOPSY SPECIMENS FROM CHILDREN WITH SUSPECTED COELIAC DISEASE. *(E.)*

Risdon, R. A.; Keeling, J. W. (Hosp. Sick Children, London, England). *Gut* 15(1):9-18, 1974.

The histological appearances of 85 peroral small intestinal biopsy specimens from children were quantitatively analyzed to obtained indices of the mucosal volume and the mucosal surface-to-volume ratio. When compared with controls, 'flat' biopsies from children with untreated celiac disease invariably showed much smaller surface-to-volume (c:lh) ratios. The mucosal volumes (h) of these biopsies were, however, significantly increased. Specimens showing less marked abnormalities (partial villous atrophy) had c:lh ratios in an intermediate range, but, like the biopsies from the untreated celiac patients, the h values were significantly increased. In morphologically normal biopsies, the correlation of surface-to-volume ratio with age showed the c:lh ratios were significantly smaller in younger children. Some of these lower c:lh ratios overlapped the range observed in abnormal biopsies showing partial villous atrophy. However, in the atrophic biopsies, additional histological changes, such as abnormalities in the surface epithelial cells and an increased inflammatory cell infiltration of the lamina propria, were invariably present. Slight changes in biopsies from children under 2 yr of age should, therefore, be interpreted cautiously, and should not necessarily be regarded as pathological on the evidence of the villous pattern alone. The quantitative technique employed proved reproducible under normal working conditions, with its greatest practical value lying in the ability to accurately follow serial changes in biopsies from the same patient.

3075 THE RELATIONSHIP BETWEEN STRUCTURE AND FUNCTION OF SMALL INTESTINE IN PATIENTS WITH A SPRUE SYNDROME AND IN HEALTHY CONTROLS. *(E.)*

Bloch, R.; Menge, H.; Lingelbach, B.; Lorenz-Meyer, H.; Haberish, F. J.; Reicken, E. O. (Med. Clin., Philipps Univ., Marburg, Germany). *Klin. Wochenschr.* 51(23):1151-1158, 1973.

The relation between structure and function of the small intestinal mucosa was studied in treated and untreated sprue in 9 patients and in 10 normal individuals. Of the 9 patients, 7 suffered from celiac disease, 1 from intestinal myeloma and 1 from unclassified sprue. Glucose, electrolyte and water absorption, as well as histochemically detectable enzymatic activities served as functional parameters. Villous circumference and height, crypt length and the number of absorptive cells/unit length indicated structural change. Glucose absorption was less than 20% of the control value in patients with untreated sprue and less than 60% in treated sprue. Sodium, potassium and water transport in the untreated condition was reversed, i.e. secreted into the lumen. After treatment, potassium was still secreted, but water and sodium were again absorbed. A highly significant linear relation existed between glucose, sodium, potassium and water absorption on the one hand, and villous height as well as villous circumference and number of absorptive cells/mm length of intestine on the other. The enzymatic activities of the absorptive cells were reduced. However, according to statistical analysis of the structural and functional data, the observed reduction in transport seemed mainly related to decreased surface area.

3076 FAMILIAL STEATORRHOEA WITH CALCIFICATION OF THE BASAL GANGLIA AND MENTAL RETARDATION.

(E.) Cockel, R.; Hill, E. E.; Rushton, D. I.; Smith, B.; Hawkins, C. F. (Queen Elizabeth Hosp., Birmingham, England). *Q. J. Med.* 42(168):771-783, 1973.

Four children, two boys and fraternal twin girls, of a sibship of 16 suffered from malabsorption, mental retardation with calcification of the basal ganglia, and episodes of pseudo-obstruction. The similarity of clinical features and subsequent investigations suggested a congenital disorder and its frequency indicated an autosomal recessive mode of inheritance. Histological studies of the whole alimentary canal removed at necropsy of a 14-yr-old twin who died of bronchopneumonia showed degenerative changes in the argyrophobe cells. Cell nuclei were all shapes and sizes, in many cases impossible to identify as neuronal, and sometimes frankly pyknotic. Argyrophobe cells produce the transmitter substance acetyl choline which initiates contraction of the smooth muscle. Their loss could explain the dilated bowel with attacks of pseudo-obstruction. Similar changes in the brain cells might explain the association between malabsorption and mental retardation.

3077 TRITIATED DIGOXIN XXII: ABSORPTION AND EXCRETION IN MALABSORPTION SYNDROMES.

(E.) Hall, W. H.; Doherty, J. E.; Gammill, J.; Sherwood, J. (Univ. Oklahoma Health Sci. Ctr., Oklahoma City). *Am. J. Med.* 56(4):437-442, 1974.

The effects of a single oral dose of tritium-labeled digoxin were followed in 7-day studies in a control group of 13 subjects without apparent disease and in 12 patients with malabsorption. Conditions existing in these patients included: nontropical sprue (2); gastrectomy (3); steatorrhea (3); diabetes mellitus (1); pancreatic steatorrhea (1); cancer of pancreas (1); regional enteritis (1); pancreatic insufficiency (1); diabetic steatorrhea (1); and rapid transit after vagotomy and pyloroplasty (2). Serum concentrations, serum half life, urine excretion and fecal excretion of digoxin were determined, and selected fecal samples were subjected to thin layer chromatography to estimate major metabolites of digoxin. Results indicated a slight excess of fecal excretion of the drug in malabsorption states, 5.8% of the amount administered. This fecal excess appeared on and was confined to the 1st day after ingestion. The excess fecal excretion was due to shortened transit time in these patients. Serum concentrations were lower in patients with malabsorption only around the time of peak serum concentration from 30 through 90 min after ingestion of the drug. It is noted that the dry sucrose cube form used in 11 of these patients with malabsorption may present digoxin to the gastrointestinal tract in a more soluble form than the tablet and therefore, the conclusion that digoxin is rather well absorbed in patients with malabsorption may apply only when relatively soluble formulations of digoxin are used.

3078 ENTEROTOXIGENIC INTESTINAL BACTERIA IN TROPICAL SPRUE.

(E.) Klipstein, F. A.; Holdeman, L. V.; Corcino, J. J.; Moore, W. E. C. (Trop. Malabsorption Unit, Univ. Rochester, N.Y.). *Ann. Intern. Med.* 79(5):632-651, 1973.

Bacterial growth was seen in cultures of fasting or postprandial midjejunal aspirates from 10 of 11 patients with tropical sprue; 2 of 4 healthy North Americans; and 7 of 9 Puerto Rican control subjects, of whom 2 had diarrhea. Aspirates from the patients with sprue had a significantly higher mean colony count and consisted predominantly of coliform organisms (*Klebsiella penumoniae* in 7, *Enterobacter cloacae* in 2, and *Escherichia coli* in 1). Both symptomatic Puerto Rican control subjects also harbored coliforms. Representative strains of the predominant coliforms isolated from each patient with sprue all produced an enterotoxin that evoked fluid secretion in the rabbit ileal-loop model, and their principal product of fermentation, ethanol, was present in aspirates from 8 of 9 patients tested. In contrast, the jejunal flora of the asymptomatic Puerto Ricans and North Americans consisted either of Gram-positive or obligatedly anaerobic bacteria. None of these subjects had ethanol in their aspirate. These results suggest that tropical sprue is not caused by one infectious agent, but rather is related to persistent enterotoxigenic coliform facteria after an episode of acute gastroenteritis. The abnormal intestinal structure and function of sprue arises from the contined colonization and toxic substance release carried on by these organisms in the small intestine. Resulting malabsorption leads to folate deficiency, resulting in distinct morphological changes. This suggestion is strengthened by the fact that folic acid therapy results in incomplete recovery brought about by partial improvement of the intestinal function whereas antibiotic therapy is associated with prompt intestinal structure and function improvement, leading to eventual reversal of the intestinal abnormalities.

3079 COELIAC DISEASE AND AUTOIMMUNITY.

(E.) Lancaster Smith, M. J.; Swarbrick, E. T.; Perrin, J.; Wright, J. T. (The London Hosp., England). *Postgrad. Med. J.* 50:45-48, 1974.

Among 57 patients with proven adult celiac disease (24 males and 33 females, aged 14-78 yr), 3 also had tyrotoxicosis, 2 insulin dependent diabetes, 3 fibrosing alveolitis, and 1 each had vitiligo, rheumatoid arthritis, and cryptogenic cirrhosis. Autoantibodies were demonstrated in 12 of the 31 patients so tested, 7 of the 12 had one of the above associated conditions. Antireticulin antibodies were found in 7 of 23 patients so tested, and there was a significant association with dietary gluten. These findings support the theory that celiac disease is associated with disturbed immunity and that a predisposition to autoimmunity may exist. It is suggested that, although the majority of patients with celiac disease do not have IgA deficiency, the local and qualitative disturbance which is apparently common in the celiac subject might in the same way predispose to autoimmune processes.

3080 COELIAC DISEASE AND MALIGNANCY. *(E.)* Barry, R. E.; Read, A. E. (Dept. Med., Univ. Bristol, England). *Q. J. Med.* 42(168):665-675, 1973.

Small-bowel epithelial-cell turnover was studied in 18 patients with subtotal atrophy of the jejunal mucosa who presented with malabsorption. Ten of these patients responded well to a gluten-free diet, and 3 of the remaining 8 patients responded to treatment with prednisone. The epithelial cell DNA loss rate was markedly decreased in the unresponsive group when compared with the patients who responded well to the gluten-free diet. In addition, the total mucosal thickness was significantly decreased in the nonresponsive group, while the mean mitotic index for the nonresponsive group was nonsignificantly decreased. Thus, the patients who failed to respond to treatment with a gluten-free diet appeared to have a decreased rate of epithelial cell turnover, i.e., a hypoplastic mucosa. The responsive and nonresponsive groups did not differ in terms of weight loss, fecal-fat excretion, or plasma protein levels. Of the 8 patients who did not respond to a gluten-free diet, 2 were found to have a reticulum-cell sarcoma, 2 a lymphosarcoma of the small bowel, 1 a focal malignancy in mesenteric nodes, and 1 mesenteric lymphadenopathy. One died of primary peritonitis and 1 is apparently well on treatment with oral prednisone 1 yr after presentation.

3081 HYPERTHYROIDISM AND ADULT CELIAC DISEASE. *(E.)* Wall, A. J.; Levinson, J. D.; Refetoff, S. (Dept. Gastroenterol., Univ. Chicago, Ill.). *Am. J. Gastroenterol.* 60(4):387-393, 1973.

A 29-yr-old housewife had nervousness, loss of weight, and diarrhea for 4 yr which responded to prednisone. Elevated serum levels of long-acting thyroid stimulator and thyroxine together with increased uptake of radioiodide by the thyroid gland confirmed the diagnosis of thyrotoxicosis due to Grave's disease. A flat jejunal biopsy, typical of adult celiac disease, was also demonstrated. Diarrhea remitted with gluten withdrawal and mucosal recovery occurred. Relapse was observed when the patient was re-exposed to gluten. Hyperthyroidism responded to treatment with radioiodide. Thyrotoxic patients may have steatorrhea but do not have villous atrophy of the jejunum. In the thyrotoxic laboratory rat, villous hypertrophy has been described. In this case, the absorptive stress of thyrotoxicosis may have unmasked latent celiac disease. This association of 2 disorders with immunologic overtones, one apparently autoimmune, the other a possible sensitivity to a dietary antigen, is of interest. The significane of the association awaits further investigation.

3082 DERMATITIS HERPETIFORMIS AND ENTEROPATHY. *(Fr.)* Agache, P.; Laurent, R. (Hosp. Ctr., Univ. Besancon, France). *Ann. Med. Interne (Paris)* 125(1):51-54, 1974.

3083 LACTOSE INTOLERANCE IN AN ARAB POPULATION. *(Ger.)* El-Schallah, M. O.; Rotthauwe, H. W.; Flatz, G. (Pediat. Clin., Univ. Bonn, Germany). *Med. Welt* 24(36):1376-1377, 1973.

3084 SUCROSE MALABSORBTION IN SPANISH STUDENTS. *(Sp.)* Pena Yanez, A.; Pena Angulo, J. F.; Rico Irles, J.; Torres Velasco, F. (2nd Med. Clin., Univ. Granada, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(7):797-810, 1973.

3085 ONE CASE OF WHIPPLE'S DISEASE WITH JOINT MANIFESTATIONS: HISTOLOGICAL EXAMINATION OF THE SYNOVIAL MEMBRANE. *(Fr.)* d'Eshougues, J. R.; Delcambre, B.; Luez, J.; Leonardelli, J.; Paris, J. C.; Mairesse, M. (Charity Hosp., Lille, France). *Rev. Rhum. Mal. Osteoartic* 41(1):61-63, 1974.

3086 COMPARISON OF FUNCTIONAL TESTS OF THE HUMAN ILEUM. *(Ger.)* Fromm, H.; Hofmann, A. F. (Med. Coll., Hannover, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1429-1432, 1972.

3087 EVOLUTION OF KWASHIORKOR AND MARASMUS. *(E.)* Jaya Rao, K. S. (Natl. Inst. Nutr., Hyderabad, India). *Lancet* (7860):709-711, 1974.

3088 QUANTITATIVE DETERMINATION AND PROPERTIES OF IMMUNOGLOBULIN ANTIBODIES IN DUODENAL SECRETION IN CELIAC DISEASE. *(Fr.)* Girard, J. P.; de Kalbermatten, A. (Cantonal Hosp., Geneva, Switzerland). *Ann. Immunol.* 124C(4):555-565, 1973.

See also 2662, 2671.

LARGE INTESTINE

3089 CHANGING PATTERNS OF COLORECTAL CARCINOMA. *(E.)* Cady, B.; Persson, A. V.; Monson, D. O.; Maunz, D. L. (Lahey Clin. Fdn., Boston, Mass.). *Cancer* 33(2):422-426, 1974.

Over the 40 years, 1928-1967, 807 surgical specimens of large bowel adenocarcinoma treated by resection were accumulated. These specimens were analyzed for maximum tumor diameter, incidence of lymph node metastases, location within the large bowel, and compared by decade. During this 40-year period, several trends in clinical presentation of disease were noted. Comparing the first to the last decade, the incidence of right colon cancer increased significantly from 7% to 22% of cases, while the relative incidence of sigmoid, rectosigmoid, and rectal carcinomas fell significantly from 80% to 62%. The size of the increasingly frequent right colon cancers was unchanged in recent years, and the incidence of lymph node metastases was constant during the decades studied. In contrast, there was a significant trend toward earlier disease in the sigmoid, rectosigmoid, and rectal cancers, manifested by a statistically significant decrease in the size of the primary cancers, a significant increase to 65% in the frequency of cases without lymph node metastases, and a decrease, to 9%, of cases with metastases to more than 3 lymph nodes. These trends are explained by the early detection techniques of sigmoidoscopy and rectal examination in recent years, by the more aggressive treatment of polyps within the reach of the sigmoidoscope, and by the greater susceptibility of the right colon to cancer in recent decades.

3090 COLONIC RESPONSE TO PENTAZOCINE. *(E.)* Stanciu, C.; Bennett, J. R. (Hull Roy. Infirm., England). *Br. Med. J.* 1(5903):312-313, 1974.

The effects of pentazocine on colonic motor activity were studied in 5 normal subjects, 5 patients with irritable bowel syndrome, and 5 patients with diverticular disease. The drug decreased intraluminal colonic pressures in all patients but 1. Since morphine, which increases intraluminal colonic pressures, is contraindicated in patients with abdominal pain of colonic origin (diverticular disease, irritable bowel syndrome), it is suggested that pentazocine may be a useful drug in such cases.

3091 CARCINOMA OF THE COLON IN PATIENTS UNDER FORTY YEARS OF AGE. *(E.)* Sanfelippo, P. M.; Beahrs, O. H. (Mayo Fdn., Rochester, Minn.). *Surg. Gynecol.* 138(2):169-170, 1974.

During a 12 year period, 118 patients less than 40 years old underwent operation for adenocarcinoma of colorectal origin. The over-all 5 year survival rate was 39%, and the hospital mortality rate was less than 1%. Loss of weight, obstructive symptoms, and a hemoglobin level of less than 12 grams per 100 milliliters at diagnosis all adversely influenced the prognosis. The 5-year survival rate was reduced from 51% for patients with grades 1 and 2 (Broders) lesions to 18% for those with grades 3 and 4 lesions. Patients with Stage C lesions (Dukes) had a 5-year survival rate of 21% compared with 67% for those with lesions of Stages A and B. There was no relationship between the age of the patient and either the grade or the stage of the lesion.

3092 REGIONAL INFUSION CHEMOTHERAPY OF HEPATIC METASTASES FROM CARCINOMA OF THE COLON. *(E.)* Cady, B.; Oberfield, R. A. (Harvard Med. Sch., Boston, Mass.). *Am. J. Surg.* 127(2):220-227, 1974.

The effects of hepatic intra-arterial infusion of 5-fluoro-2'-deoxyuridine (5-FUDR) in 51 consecutive patients with hepatic metastases from carcinoma of the colon were studied. An objective response was recognized in 57% by decreased hepatic size, 61% by improved hepatic scan, 59% by improved biochemical hepatic function tests, and 39% by improved angiograms. These categories of objective response were not always interrelated. Thus, on the basis of at least one objective response and symptomatic improvement, a clinical response rate of 71% was achieved. Patients with a clinical response had a median survival of 16 months; nonresponders had a median survival of 5 months. Factors related to response rate and prolonged survival were young age, absence of ascites, presence of jaundice, and less extensive involvement of the liver. The presence of extrahepatic intra-abdominal metastases did not affect the response rate or survival time, indicating the controlling effect of the hepatic metastases. These response rates are substantially higher than those reported with systemic chemotherapy and indicate that regional chemotherapy of hepatic metastases from carcinoma of the large bowel should be more widely studied and adopted.

3093 AGANGLIONIC MEGACOLON IN PIEBALD-LETHAL MICE. *(E.)* Webster, W. (Dept. Anat., Univ. Virginia, Charlottesville). *Arch Pathol.* 97 (2):111-117, 1974.

The autonomic innervation of the colon was examined histochemically in a strain of mice (piebald-lethal, s^1) that develop congenital aganglionic megacolon. The normal periganglionic adrenergic innervation was completely absent in the aganglionic zone but normally developed in the transitional and ganglionic zones. The cholinergic innervation was more complex. The transitional zone showed a number of ganglia and intermuscular nerves but very few postganglionic intramuscular motor nerves. The proximal aganglionic zone was almost denervated; there was a number of intermuscular nerves but few in the muscle layers. The distal aganglionic zone varied in appearance and length; it was usually characterized by an almost normal number of intramuscular nerve fibers Obstruction was considered to be primarily due to the denervated proximal aganglionic zone; this obstruction was enhanced by the presumably poor propulsive power of the transitional zone.

3094 OBSERVATIONS ON FIFTEEN INOPERABLE/NONRESECTABLE CASES OF RECTAL CANCER GIVEN PREOPERATIVE IRRADIATION. *(E.)* Kligerman, M. M.; Urdaneta-Lafee, N. (Yale Univ. Sch. Med., New Haven, Conn.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 120(3):624-626, 1974.

3095 SURGICAL CORRECTION OF AGANGLIONIC MEGACOLON. *(E.)* Breidenbach, L. M.; Karayannacos, P. E.; Toth, L. S.; Pace, W. G. (Ohio State niv. Hosp., Columbus). *Am. J. Surg.* 127(2):133-135, 974.

096 RECENT EXPERIENCE IN THE MANAGEMENT OF CANCER OF THE COLON AND RECTUM. *(E.)* elch, J. P.; Donaldson, G. A. (Massachusetts Gen. osp., Boston). *Am. J. Surg.* 127(3):258-266, 1973.

097 MANAGEMENT OF SEVERE OBSTRUCTION OF THE LARGE BOWEL DUE TO MALIGNANT DISEASE. *(E.)* elch, J. P.; Donaldson, G. A. (Massachusetts Gen. osp., Boston). *Am. J. Surg.* 127(4):492-499, 1974.

098 ACUTE LARGE BOWEL OBSTRUCTION. COMPARISON OF COUNTY, VETERANS ADMINISTRATION, AND OMMUNITY HOSPITAL POPULATIONS. *(E.)* Greenlee, H. .; Pienkos, E. J.; Vanderbilt, P. C.; Byrne, M. P.; ason, J. H.; Banich, F. E.; Freeark, R. J. (VA Hosp., ines, Ill.). *Arch. Surg.* 108(4):470-476, 1974.

099 ACUTE APPENDICITIS COMPLICATING PREGNANCY IN THE OXFORD REGION. *(E.)* Finch, D. R. .; Lee, E. (Radcliffe Infirm., Oxford, England). *r. J. Surg.* 61(2):129-132, 1974.

100 EVALUATION OF A BULK-FORMING EVACUANT IN THE MANAGEMENT OF HAEMORRHOIDS. *(E.)* roader, J. H.; Gunn, I. F.; Alexander-Williams, J. en. Hosp., Birmingham, England). *Br. J. Surg.* 1(2):142-144, 1974.

101 FAMILIAL POLYPOSIS OF COLON AND RECTUM: CASE REPORTS FOR DIAGNOSIS AND THERAPY. *er.)* Hantschmann, N.; Nemsmann, B. (Surg. Clin., niv. Kiel, Germany). *Dtsch. Med. Wochenschr.* (10):453-457, 1974.

102 ADVANCED COLON CANCER: REVIEW OF 123 CASES AT UNIVERSITY OF MISSISSIPPI MEDICAL CENTER, 1966-1969. *(E.)* Stribling, J.; Smith, M. P.; Smith, G. V. (Univ. Mississippi Med. Ctr., Jackson). *Miss. Med. Assoc. J.* 15(3):94-99, 1974.

3103 AN ANATOMICAL ANALYSIS OF THE TREATMENT OF PROLAPSE OF THE RECTUM. *(E.)* Wilson, P. M. (Dept. Anat., Univ. Cape Town, South Africa). *S. Afr. Med. J.* 47(28):1233-1235, 1974.

3104 EPIPLOIC APPENDAGITIS. *(E.)* Thomas, J. H.; Rosato, F. E.; Patterson, L. T. (Univ. Pennsylvania Sch. Med., Philadelphia). *Surg. Gynecol. Obstet.* 138(1):23-25, 1974.

3105 FAILURES OF ELECTROCOAGULATION OF PRIMARY CARCINOMA OF THE RECTUM. *(E.)* Wanebo, H. J.; Quan, S. H. Q. (Mem. Hosp. Cancer Allied Dis., New York, N.Y.). *Surg. Gynecol. Obstet.* 138(2):174-176, 1974.

3106 DIFFUSE LYMPHOMA OF THE INTESTINES WITH A MONOCLONAL GAMMOPATHY OF IgG_3 KAPPA TYPE. *(E.)* Kopec, M.; Swierczynska, Z.; Pazdur, J.; Luft, S.; Plachecka, M.; Dabska, M.; Glinska, D.; Wozniczko Orlowska, G. (Inst. Rheumatol., Warsaw, Poland). *Am. J. Med.* 56(3):381-385, 1974.

3107 HISTOPATHOLOGY OF NEOPLASTIC DISEASES OF THE COLON. *(Ger.)* Elster, K. (Munic. Hosp., Bayreuth, Germany). *Leber Magen Darm* 3(3):111-117, 1973.

See also 2915, 2934, 2944, 2945, 2946, 2953, 2957, 2960, 2961, 2970, 2971, 3051, 3055, 3059, 3062, 3068, 3071, 3352, 3368.

LARGE INTESTINE

Ulcerative Colitis

08 THE PROGNOSIS OF ULCERATIVE COLITIS. *(E.)* Bonnevie, O.; Binder, V.; Anthonisen, P.; is, P. (Gentofte Univ. Hosp., Hellerup, Denmark). *and. J. Gastroenterol.* 9(1):81-91, 1974.

regional and representative group of 332 patients s studied to determine the prognosis of ulceraive colitis. The results of the investigation into e prognosis of ulcerative colitis seem to indicate at 1) male patients, 2) patients diagnosed at a te age, and 3) patients diagnosed shortly after e clinical debut show the greater probability of ing from ulcerative colitis. In patients tolerat-g salazosulphapyridine, this drug constituted the basic medical treatment, in doses of 3 to 4 g daily in acute cases, and of 1 to 2 g as long-term treatment. When this treatment proved insufficient local and universal corticosteroids were given. If the clinical condition did not improve or if the condition worsened, surgery was undertaken. Indications for surgery were 1) acute, severe cases, 2) chronic courses, 3) signs of permanent strictures, 4) retarded growth, and 5) cases of symptoms for more than 10 years. The operations were: 1) primary total proctocolectomy with ileostomy, 2) total colectomy with ileostomy and retained rectal stump, 3) total colectomy with primary ileorectal anastomosis, 4) secondary rectal extirpation after total colectomy with ileostomy, and 5) secondary ileorectal anastomosis following a primary total colectomy with ileostomy. No excess of deaths occurred as a result of ulcerative colitis in patients treated exclusive on medical lines. The early postoperative fatality was the same whether surgery was undertaken at the time of the first attack, or after 1, 2, or 3 years of treatment and observation.

3109 THE DRUG THERAPY OF ULCERATIVE COLITIS AND OF CROHN'S DISEASE. *(E.)* Tumen, H. J. (Grad. Hosp., Univ. Pennsylvania, Philadelphia). *Semin. Drug Treat.* 3(4):339-349, 1974.

3110 SCANNING ELECTRON MICROSCOPE FINDINGS IN SOME CASES OF ULCERATIVE COLITIS. *(It.)* Marinozzi, G.; Gabrielli, L.; Luminari, M. (Med. Surg. L.I.U., Aquila, Italy). *Boll. Soc. Ital. Biol. Sper.* 48(22):921-922, 1972.

See also 3130, 3305.

PANCREAS

3111 BY-PASS PROCEDURE FOR PALLIATION IN OBSTRUCTIVE JAUNDICE. *(E.)* Mendoza, Jr., C. B.; Easley, G. W. (Amer. Coll. Surg., Morgantown, W. Va.). *W. Va. Med. J.* 70(2):27-28, 1974.

3112 ANALGESIC ACTION OF MORPHINE IN INTENSIVE KININ PRODUCTION ASSOCIATED WITH ACUTE PANCREATITIS. *(Pol.)* Braszko, J.; Wisniewski, K. (Acad. Med., Bialystok, Poland). *Pol. Tyg. Lek.* 28(29):1108-1110, 1973.

3113 ANALYSIS OF PANCREATODUODENECTOMY. *(E.)* Gatti, D. J.; O'Brien, P. H.; Grooms, G. A. (Med. Univ. South Carolina, Charleston). *S. Med. J.* 67(3):278-286, 1974.

3114 STUDIES OF DISORDERS IN FAT DIGESTION IN PANCREATIC INSUFFICIENCY. *(Ger.)* Siede, W.; Erb, W. (Ctr. Intern. Med., Univ. Frankfurt/Main, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1418-1420, 1972.

See also 2922, 2924, 2928, 2938, 2951, 3118, 3170, 3296.

PANCREAS

Pancreatitis

3115 A CONTROLLED TRIAL OF TRASYLOL IN THE TREATMENT OF ACUTE PANCREATITIS. *(E.)* Trapnell, J. E.; Rigby, C. C.; Talbot, C. H.; Duncan, E. H. L. (Roy. Victoria Hosp., Bournemouth, England). *Br. J. Surg.* 61(3):177-182, 1974.

The effectiveness of Trasylol (800,000 U/day for 5 days i.v.) was tested in a prospective double blind controlled study involving 105 patients in their first proved acute attack of pancreatitis. The patients were managed on an identical strict protocol except that they received either Trasylol A (active Trasylol) or B in a random fashion. At the conclusion of the acute episode, the illness was assessed according to criteria which were not open to observer modification and each attack was categorized as mild, moderate, severe, or fatal. The mortality rate was 7.5% in group A and 25% in group B; the difference is statistically significant. In the Trasylol-treated group the normally observed tendency for mortality to rise with advancing age was abolished. Thus, Trasylol must be regarded as a beneficial drug for the treatment of acute pancreatitis.

3116 ETIOLOGY AND COURSE OF PRIMARY CHRONIC PANCREATITIS IN WESTERN FRANCE. *(E.)* Gastard, J.; Joubaud, F.; Farbos, T.; Loussouarn, J.; Marion, J.; Pannier, M.; Renaudet, F.; Valdazo, R.; Gosselin, M. (Ctr. Hosp., Univ. Rennes, France). *Digestion* 9(5):416-428, 1973.

Primary chronic pancreatitis was studied in 263 male patients from Western France. The incidence of this disease amounted to 0.6% of all patients consulting a gastroenterologist. Considering geological characteristics, chronic pancreatitis was found rarely in patients residing in areas of granitic soils. The age of onset of the disease ranged from 15 to 64 yr, peaking between 30 and 40 yr. Chronic pancreatitis was relatively uncommon in rural areas in contrast to the high incidence of alcoholism in persons living in these areas. For various occupational groups the incidence of this disease vs. the population of the group were: employers, 7.3% (incidence) vs. 9.66% (population); professional classes, 8.5%, 3.8%; middle-management personnel, 8.9%, 6.6%; manual workers, 45.3%, 41.2%; white-collar workers, 6.9%, 6.3%; domestics, 3.2%, 0.9%; and armed forces, 5.7%, 2.8%. Obesity prior to the onset of the disease was a frequent finding, with the excess of calories related to an excessive intake of all nutriments considered. Alcoholism was present in 84.8% of the patients, 36% to a severe degree, consuming more than 200 ml absolute alcohol/day. Pancreatic pain was a feature in 96.6% of these cases id manifested itself in ways varying in frequency id intensity. Complications occurred throughout ie course of the disease, especially during the early ears, and included pancreatic pseudocyst (51 cases), emorrhage from the alimentary tract (13), duodenal tenosis (10), jaundice (25), pericarditis (4), leurisy (16), and psychiatric disorders (12). Studies f the liver revealed that cirrhosis was frequent 28.8%), occurring mainly in agricultural populations, ı older patients, in heavy drinkers, and in patients ıving a disorder in carbohydrate metabolism and ıncreatic calcification. Of the 31 deaths in this eries pancreatitis accounted for 5, and cirrhosis r 10. The high incidence of death from cirrhosis ıdicates the need for withdrawal therapy for alcoılics. Exocrine function was studied in 66 patients ıd was noted that in 40% of these cases, anatomiıl damage was severe enough to cause steatorrhea ı excess of 10 g/day. Surgery was performed in 104 tients including left pancreatectomy (34 cases), ght pancreatectomy (19), total pancreatectomy (2), ıncreaticojejunostomy (28), splanchnicectomy (8), stoanastomosis (4), and shunt operations (9).

17 AN INTERNATIONAL SURVEY ON NUTRITION AND PANCREATITIS. *(E.)* Sarles, H. (Res. Unit. thol. Dis., INSERM, Marseille, France). *Digestion* 5):389-403, 1973.

e frequency of acute and chronic pancreatitis in lation to nutrition has been studied in 16 countries Africa, Latin America, Asia, and Europe. Results this study indicate that nearly 2 people out of ery hundred in the world apparently die from a pan-eatic disease, especially cancer, which alone re-esents 1% of the causes of death in this survey. e incidence of pancreatic cancer appears to be in-easing at a rate of 15% per decade. A great dif-rence in distribution of pancreatic disease ap-ared from one country to another. It was noted at diets rich in proteins and fats are associated th acute pancreatitis and with pancreatic cancer. gh carbohydrate diets (from malnutrition or un-lanced diets) were associated with all pancreatic seases and diets poor in all constituents, except some cases alcohol, were associated with other uses of death. Diets rich in alcohol gave rise chronic calcifying pancreatitis but not acute pan-eatitis or cancer of the pancreas. The age of set of chronic calcifying pancreatitis averaged .4 yr, except for India where it was 12.5 yr, ssibly due to malnutrition in childhood. Onset es for chronic pancreatitis without calcification re similar, but those for acute pancreatitis were gnificantly higher. Patients with chronic calci-ing pancreatitis averaged 10 cm shorter in height an those with acute pancreatitis, suggesting the esence of some defect prior to the onset of this sease, with the clinical manifestations appearing ter the end of the growth period. Weight loss, roblem in this disease, was significantly greater patients with chronic pancreatitis, particularly ose with calcification. It is therefore concluded at acute pancreatitis and chronic calcifying pan-eatitis are quite distinct in both etiology and ographical distribution. There is a significant rrelation between geographical distribution of chronic calcifying pancreatitis and that of pancreatic cancer. Chronic calcifying pancreatitis seems correlated to alcoholism in centers where nutrition is satisfactory and with protein deficiency in others.

3118 CHRONIC CALCIFYING PANCREATITIS AND PANCREATIC CARCINOMA IN JAPAN. *(E.)* Ishii, K.; Nakamura, K.; Takeuchi, T.; Hirayama, T. (Hosp. Natl. Cancer Ctr., Tokyo, Japan). *Digestion* 9(5): 429-437, 1973.

Etiological factors, especially alcohol intake, in the development of chronic calcifying pancreatitis in Japan were studied, including comparisons between some environmental factors with regard to calcifying pancreatitis and pancreatic carcinoma. The study included 150 patients with chronic calcifying pancreatitis (male/female ratio 3.5/1.0, average age 45 yr) and 1,070 patients with carcinoma of the pancreas (male/female ratio 1.9/1.0, 70% were in their 5th and 6th decades of life). Comparisons of occupation, smoking habits, alcohol and food intake were made on male patients over 40 yr of age with calcifying pancreatitis (42 cases) or with carcinoma of the pancreas (311 cases). Frequency of both pancreatic carcinoma and calcifying pancreatitis was significantly higher in professional managing and service workers and significantly lower in agricultural workers when compared to controls. No significant differences between the diseases themselves were observed. In cases of carcinoma of the pancreas, daily intake of meat, fish, milk, and soybean paste soup were significantly higher while daily intake of rice, vegetables, and pickels were significantly lower. No differences in food intake were noted between the calcifying pancreatitis group and controls. In comparing the two diseases, it was noted that the only significant difference was in the daily intake of alcohol which was higher in calcifying pancreatitis patients. As for etiological factors of calcifying pancreatitis, heavy alcohol consumption occurred in 32.6% of the patients, 10.0% had gallstones, 11.3% had previous history of acute pancreatitis, 2.0% had abdominal surgery, 2.6% had hereditary pancreatitis. The relation between the daily intake of alcohol and the exocrine/endocrine functions of the pancreas were described in 145 patients with calcifying pancreatitis. The frequency of exocrine dysfunction of the pancreas was higher in patients drinking large amounts of alcohol.

3119 RECURRENT PANCREATITIS ASSOCIATED WITH NORMOCALCEMIA, PARATHYROID HYPERPLASIA, AND INCREASED SERUM PARATHORMONE. *(E.)* Danzi, J. T.; Farmer, R. G.; Esselstyn, G. B. (Cleveland Clin., Ohio). *Cleve. Clin. Q.* 41(1):39-43, 1974.

A 14 yr old white girl was diagnosed as having severe relapsing pancreatitis associated with a normal serum calcium level, parathyroid hyperplasia, and elevation of serum parathormone level to 3 times the normal range for her age. No pancreatic calcification was present. The nearly normal serum calcium and depressed serum phosphorus levels during an episode of acute pancreatitis were clues to the diagnosis of hyperparathyroidism. In normocalcemic hyperparathyroidism related to pancreatitis, the serum calcium value is normal during the acute episode and the symptom-free intervals. No evidence of pancreatic insufficiency or osteomalacia was found in this patient. In considering the pathogenesis of pancreatitis related to hyperparathyroidism, it was noted that thromboarteritis and focal pancreatic tissue necrosis have resulted in laboratory animals after administration of parathormone, and the direct role of parathormone in the etiology of pancreatitis must therefore be considered. Such an etiology is supported by the elevation of the patient's serum parathormone and the correlation with the patient's symptoms before and after surgery.

3120 NEAR TOTAL PANCREATECTOMY FOR HEMORRHAGIC PANCREATITIS. *(E.)* Norton, L.; Eiseman, B. (Denver Gen. Hosp., Col.). *Am. J. Surg.* 127(2): 191-195, 1974.

Near total pancreatectomy of 65 to 85% was performed in 4 patients (2 males and 2 females, aged 24-47 yr) judged to be dying from acute hemorrhagic pancreatitis. The operation began with mobilization of the spleen to allow left to right dissection of the pancreas. The splenic artery was ligated after division of the spleen's attachments. Retracting the spleen anteriorly allowed identification of the tail of the pancreas, despite surrounding inflammation. A plane of dissection posterior to the pancreas was easily established. Blunt or sharp dissection through inflammatory tissue quickly exposed the pancreas which was peeled from the surrounding edematous hemorrhaging tissue. Dissection proceeded rapidly to the confluence of the splenic and superior mesenteric veins. The splenic vein was then divided. Venous tributaries from the pancreas were usually thrombosed or often divided without trying. Patients with disease of 2 day's duration or less survived despite postoperative complications of respiratory distress syndrome (2), and delirium tremens (1). They were discharged from the hospital 11 to 20 days after surgery. The only late complication was diabetes in 1 case. The 4th patient, who was in a terminal condition when operated on after 1 week of the disease, died 3 weeks after pancreatectomy as a result of sepsis due to intestinal leakage. Recovery was dramatic before the occurrence of sepsis. The primary indication for near total pancreatectomy is failure of nonoperative treatment. The optimal time for surgery appears to be 24 to 48 hr after onset of the disease. Gray-Turner or Cullen's signs were not present in these patients, and diagnostic paracentesis would have failed to confirm the disease in 1 of these cases. None of these patients had abnormally low serum calcium levels prior to surgery. The operation is recommended in patients dying from acute hemorrhagic pancreatitis when nonoperative therapy has failed.

3121 MAJOR GASTROINTESTINAL HEMORRHAGE ASSOCIATED WITH PANCREATIC PSEUDOCYST. *(E.)* Wolstenholme, J. T. (VA Ctr., White River Junction, Vt.). *Am. J. Surg.* 127(4):377-381, 1974.

An aggressive surgical approach was used in 3 male patients (aged 40-50 yr) with pancreatitis complicated by massive bleeding. In 1 case, bleeding originated from a pseudocyst in the head of the pancreas and involved the gastroduodenal artery. This was treated successfully with excision of the cyst and head of the pancreas. Intracystic suture-ligation of the bleeding vessel together with cystogastrostomy was performed in 2 other cases, one a pancreatic pseudocyst with splenic artery hemorrhage and the other a pancreatic pseudocyst with splenic artery erosion. In each case, the aggressive surgery which was undertaken was apparently life-saving. It is felt that in patients with bleeding who are known to have pancreatitis or a pseudocyst, this organ must be considered as a possible site of the hemorrhage. The palpation of an upper abdominal mass may help in establishing the presence of a pseudocyst. If the mass shows a rapid increase or decrease in size, bleeding into or from the cyst should be suspected. The presence of a bruit or pulsations in the upper part of the abdomen would support the vascular nature of the lesion. It is suggested that the celiac axis and superior mesenteric artery angiography be performed prior to barium contrast studies. By demonstrating a pseudocyst-aneurysm, such a study would confirm the diagnosis and, in addition, might identify the leaking vessel, thereby permitting the use of a more precise surgical approach to include isolation and control of the bleeding vessel prior to opening the pseudocyst.

3122 SURGICAL INTERVENTION IN ACUTE NECROTIZING PANCREATITIS. *(E.)* Warshaw, A. L.; Imbembo, A. L.; Civetta, J. M.; Daggett, W. M. (Massachusetts Gen. Hosp., Boston). *Am. J. Surg.* 127(4):484-491, 1974.

Acute pancreatitis in 38 patients was treated with an operation that included cholecystostomy, gastrostomy, feeding jejunostomy, and sump drainage of the peripancreatic lesser sac. Of 11 patients judged to be dying of fulminant pancreatitis in the first 48 hr of treatment, 9 improved immediately and 7 survived. Of 18 who underwent operation because of persistent or increased signs of inflammation 2 weeks after admission, 7 had an immediate favorable response, mainly due to drainage of abscesses, necrotic pancreas, or pseudocysts and 12 survived. Pancreatitis of lesser severity in 9 patients received no apparent benefit from the operation. In 9 patients gastrostomy and jejunostomy were used for prolonged treatment of intestinal dysfunction. In 6 patients the cholecystostomy helped control bacterial cholangitis. In 7 patients the peripancreatic sumps provided tracts for the late drainage of abscesses, pancreatic fistulas, and sloughed pancreas. The major postoperative problem was the development of intra-abdominal abscesses which occurred in 16 patients. Of the 13 deaths in the series, 10 were directly related to these abscesses. The survival of patients with severe pancreatitis resistant to standard medical easures appears to be improved by this operative pproach. It is suggested that an aggressive pproach to re-exploration and drainage of late ancreatic abscesses in patients with necrotizing ancreatitis should improve still further the urvival rate of patients.

123 FAMILIAL HYPERLIPOPROTEINEMIA AND ACUTE PANCREATITIS. STUDY OF ONE FAMILY WITH REDRICKSON'S TYPE I HYPERLIPOPROTEINEMIA. *(Por.)* ott, C. de B.; Brandao, M. I. B.; Ohki, Y. archese, N.; Bettarello, A. (Clin. Hosp., Sao aulo, Brazil). *Arq. Gastroenterol. S. Paulo* 1(1):17-22, 1974.

124 SURGERY IN CHRONIC RECURRENT PANCREATITIS. *(Ger.)* Hegglin, J.; Bleuler, P.; Ammann, .; Akovbiantz, A. (Munic. Hosp., Waid, Switzerland). *elv. Chir. Acta* 41(1/2):165-170, 1974.

125 SURGERY IN THE COURSE OF CHRONIC RECURRENT PANCREATITIS. *(Ger.)* Hahnloser, P.; aez, C.; Hammer, B.; Ammann, R. (Cantonal Hosp., urich, Switzerland). *Helv. Chir. Acta* 41(1/2): 59-164, 1974.

3126 PSEUDOCYST OF THE PANCREAS WHICH DEVELOPED INSIDE THE LIVER. *(Fr.)* Gautier-Benoit, C.; Luez, J.; Cecile, J. P. (Hosp. Ctr., Lens, France). *Sem. Hop. Paris* 50(18):1235-1237, 1974.

3127 ALCOHOLIC PANCREATITIS. *(Ger.)* Forell, M. M.; Stahlheber, H. (2nd Med. Clin., Univ. Munich, Germany). *Med. Klin.* 68(46):1497-1499, 1973.

3128 THE CLINICAL FEATURES OF PANCREATIC INFLAMMATION. *(E.)* Tuzhilin, S. A. (First Moscow Med. Inst., USSR). *Am. J. Gastroenterol.* 61(2):97-112, 1974.

3129 MODERN VIEWS ON THE SURGICAL MANAGEMENT OF PRIMARY CHRONIC PANCREATITIS. *(It.)* Doldi, S. B.; Perrucci, C. (Dept. Semeiotic Surg., Univ. Milan, Italy). *Minerva Chir.* 28(13/14): 991-1000, 1973.

See also 2922, 2927, 2932, 2951, 3113, 3150, 3264.

LIVER AND BILIARY TRACT

130 CHRONIC LIVER DISEASE ASSOCIATED WITH CHILDHOOD ULCERATIVE COLITIS. *(E.)* Tog-ill, P. J.; Benton, K. P. E.; Smith, P. G. (Gen. osp., Nottingham, England). *Postgrad. Med. J.* 0(579):9-15, 1974.

mong 301 patients with ulcerative colitis seen be-ween 1961 and 1971, 48 developed the disease before he age of 20 yr and 4 of the 48 progressed to seri-us liver disease. In the remaining 253 older pa-ients, there were only 3 cases of chronic liver isease. The histories of the 4 childhood cases of olitis and associated liver disease are presented. iver histology in these patients was fibrosis (1), irrhosis (1), sclerosing cholangitis (1), and peri-holangitis (1). The liver lesions of childhood co-itis followed a similar histopathological pattern o those seen in adult colitis, and the hepatic esions in the in patients developing colitis in hildhood were unrelated to the extent, duration, r severity of the colitis. Although the data in-icate that the onset of ulcerative colitis in hildhood carries a considerable risk of subsequent erious liver disease, the precise nature of the elationship remains to be clarified.

131 ARTERIAL INFUSION CHEMOTHERAPY OF HEPATOMA. *(E.)* Cady, B.; Oberfield, R. A. (Lahey lin. Fdn., Boston, Mass.). *Surg. Gynecol. Obstet.* 38(3):381-384, 1974.

f 54 patients with pathologically proven primary arcinoma of the liver, 18 were treated by region rterial infusion chemotherapy, 5 underwent resection, and the remainder, usually untreated, served as nonconcurrent controls. No patient showed any evidence of another primary tumor at any time. Floxuridine (0.3 mg/kg/day) was the primary drug used in all patients, although fluorouracil (3-5 mg/kg/day) was given occasionally and methotrexate (5 mg/kg/day) was used for a period in 1 patient. Five of the 18 patients who were treated with infusion chemotherapy died as a result of the treatment program; all were over 55 yr of age. The median survival time was 16.5 months in the remaining male patients and 8 months in the remaining female patients. Eleven of the 18 patients were definitely symptomatically improved by infusion chemotherapy and 8 patients were substantially improved symptomatically. All instances of significant improvement and only one treatment-related death occurred during the last 5 yr of the study. No patient had a return to normal of all laboratory or clinical features with infusion chemotherapy. A trial of intra-arterial chemotherapy should be undertaken in primary liver cell carcinoma if resection is not possible.

3132 PRIMARY LIVER CANCER: A REVIEW OF THE CLINICAL FEATURES, BLOOD GROUPS, SERUM ENZYMES, THERAPY, AND SURVIVAL OF 65 CASES. *(E.)* Al-Sarraf, M.; Go, T. S.; Kithier, K.; Vaitkevicius, V. K. (Milton Darling Mem. Ctr., Detroit, Mich.). *Cancer* 33(2):574-582, 1974.

Of 65 patients with primary liver cancer, 53 had hepatocarcinomas. Primary cancer of the liver was most frequently observed in patients between 50 and

80 yr of age, and the incidence was three times as great in males as in females. The incidence of hepatocarcinoma was greater among blacks, especially those with blood group B. The most common symptoms associated with primary liver cancer were upper abdominal pain, weakness, and weight loss, while the most commonly observed signs were hepatomegaly or an abdominal mass: jaundice and ascites were also common. Serum alkaline phosphatase, SGOT, SGPT, and LDH were elevated in most of the 65 patients studied. In the patients with hepatocarcinoma, 66% had histologically confirmed liver cirrhosis at autopsy. Serial α-fetoprotein (AFP) tests were performed on 19 patients with hepatoma; AFP was detected in 14 of these. No Australia antigen was detected in 12 patients with hepatoma. Nine of 16 patients had subjective and objective tumor responses with continuous 5-floxuridine hepatic artery infusion. None of the 18 patients treated with systemic cytotoxic agents responded. The difference in response between hepatic artery infusion and systemic therapy is statistically significant. The patients who responded to intrahepatic artery infusion survived significantly longer than the nonresponders and the patients who received systemic chemotherapy. Autopsies were performed on 30 patients with hepatocarcinoma and 9 patients with cholangiocarcinoma. The majority of hepatocarcinoma patients had metastases to the lungs and lymph nodes, while 55% of the cholangiocarcinoma patients had metastases to the bone.

3133 NEEDLE-LIKE CYTOPLASMIC INCLUSIONS IN THE LIVER IN PORPHYRIA CUTANEA TARDA. *(E.)*
Waldo, E. D.; Tobias, H. (VA Hosp., New York, N.Y.). *Arch. Pathol.* 96(6):368-371, 1973.

Liver biopsy specimens from 16 patients with porphyria cutanea tarda (PCT) were examined by light, electron and fluorescence microscopy. Light microscopy revealed the presence of needle-shaped cytoplasmic inclusions in all of the specimens; in most instances these inclusions were present in less than 25% of the cells. When examined with the fluorescence microscope, the inclusions demonstrated the characteristic spectrum of porphyrin fluorescence. The amounts of the fluorescent material seemed to correlate with the presence of lipofuscin deposits within the cells. Other less specific changes associated with hepatic disease were regularly found, but there was no correlation between their severity and the presence or frequency of the needle-shaped inclusions. Electron microscopy showed electrolucent, needle-like areas, usually surrounded by electron-dense areas that appeared lysosomal in character, in 7 of 8 biopsy specimens. The needle-shaped bodies were always found in the cytoplasm of hepatocytes and were generally present singly. In addition, paracrystalline structures consisting of parallel arrays of densely osmophilic bands alternating with light interspaces were present within the mitochondrial matrix in 10-40% of the mitochondria of 3 specimens.

3134 POSTNATAL CYTOMEGALOVIRUS HEPATITIS. AN AUTOPSY AND LIVER BIOPSY STUDY. *(E.)*
Henson, D. E.; Grimley, P. M.; Strano, A. J. (Natl. Cancer Inst., Bethesda, MD). *Hum. Pathol.* 5(1):93-103, 1974.

Cytomegalovirus hepatitis was studied in 13 patients 11 had died during disseminated cytomegalovirus infection and 2 had liver biopsies for suspected hepatitis. Histologically, inclusions were present in liver cells of all 3 lobular zones and less frequently in the vascular endothelium of the portal areas. Infected liver cells were seen in the cords, partially extruded into sinusoids, or within sinusoids where they were surrounded by inflammatory cell that formed small focal lesions. Once surrounded, infected cells degenerated into acidophilic bodies. In portal areas in which inclusions were seen there was a variable infiltration of acute and chronic inflammatory cells. The number of infected cells varied considerably in the livers from different patients. In the 2 patients with liver biopsies, the serum glutamic oxaloacetic transaminase, serum glutamic pyruvic transaminase, and alkaline phosphatase activities were transiently increased. Serological studies in these 2 patients showed high titers of cytomegalovirus hepatitis is characterized by a foca mononuclear cell infiltration in the lobules and a pleomorphic cell infiltration in the portal areas. The lesions associated with virus infected cells are not diagnostic except when intranuclear inclusions are seen. The histological lesions of biopsy proved cytomegalovirus hepatitis resemble the changes seen in livers of patients dying with hepatic involvement during disseminated infection. It is concluded that the diagnosis of cytomegalovirus hepatitis can be made only by finding inclusion bearing cells in the liver. The diagnosis can be inferred by isolating cytomegalovirus or by demonstrating a 4 fold or grea rise in cytomegalovirus antibody titer contemporary with liver function abnormalities or hepatomegaly.

3135 RADIATION THERAPY OF LIVER METASTASES. *(Ger.)* Dalluge, K. H.; Eichhorn, H. J.; Scholz, P.; Huttner, J. (Ctr. Inst. Cancer Res., Robert Rossle Clin., Berlin, Germany). *Strahlentherapie* 144(5):522-532, 1972.

Palliative radiotherapy was administered to 10 patients who had liver metastases as the only metastases from primary carcinomas of the lung (6 cases), esophagus (3 cases), and stomach (1 case). With the exception of the patient with stomach cancer, all patients received radiation over the entire liver with sloping fixed ^{60}Co fields in doses of 50 R HD given at 5-day intervals (total doses of 500-5500 R HD). Responses of these patients were compared with those of 11 patients who received radiotherapy for lung cancer but not for liver metastase since other metastases were present. Liver functio tests and clotting status were investigated at 2-week intervals before, during, and after radiotherap and histological examinations of the liver were performed at autopsy in 9 cases. Radiotherapy caused decreases in serum bilirubin levels in all patients with hyperbilirubinemia. Survival time was only 4- days in the 3 patients with initial increases in SGOT and SGPT activities, while the levels of these enzymes increased in controls about 4 weeks before

eath. It is concluded that radiotherapy shortened
he survival of patients whose transaminase activities
ere initially increased. Survival times in the
emaining 7 patients ranged from 56 to 113 days
average of 2 months). Serum aldolase activities
ere the most reliable criterion for the development
f other metastases. Hyalin formation and the de-
elopment of fibrosis occurred in metastases with
oses of 3900 R HD or more, while severe damage was
oserved in the hepatic parenchyma only when doses
xceeded 5000 R HD. It is concluded that the optimum
ose for palliative irradiation of hepatic metastases
s 4000 R HD.

136 α_1-ANTITRYPSIN DEFICIENCY IN CHRONIC LIVER
DISEASE, AND A REPORT OF CIRRHOSIS AND EM-
HYSEMA IN ADULT MEMBERS OF A FAMILY. *(E.)* Kumar,
.; Lancaster-Smith, M.; Cook, P.; Stansfeld, A.;
lark, M. L.; Dawson, A. M. (St. Bartholomew's Hosp.,
ondon, England). *Br. Med. J.* 1(5904):366-367, 1974.

ie case report of a 25-yr-old man with cirrhosis
nd a childhood history of liver disease is presented
ie patient was subsequently found to have α_1-anti-
ypsin deficiency. The proband's father, aged 56,
id an 8-yr history of emphysema and was also found
have α_1-antitrypsin deficiency. The proband's
other and paternal grandmother showed no evidence
liver or pulmonary disease. Comparatively high
-antitrypsin levels were found in 30 unrelated
ult patients with chronic liver disease. Although
-antitrypsin deficiency is probably a rare cause
symptomatic cirrhosis in adults, it should be
nsidered in adult cirrhotic patients with unusual
thological features when there is no other obvious
iology. Suspicion should also be raised when there
a history of hepatic disease in infancy or child-
od. Homozygous or heterozygous deficiency of α_1-
titrypsin will be common among close relatives of
ch patients.

37 THE CHANGING ETIOLOGY OF LIVER ABSCESS.
FURTHER OBSERVATIONS. *(E.)* de la Maza,
M.; Naeim, F.; Berman, L. D. (Mallory Inst. Path-
., Boston, Mass.). *JAMA* 227(2):161-163, 1974.

e incidence of liver abscess discovered at autopsy
the Mallory Institute of Pathology has remained
irly constant over the past 70 years (0.57%). The
uses, however, are changing. In a review of 55
ses over the period 1959 through 1968, it was dis-
vered that (1) the incidence of liver abscess
condary to acute appendicitis decreased, but liver
scess secondary to biliary obstruction from chole-
thiasis or carcinoma increased, and (2) the percen-
ge of abscesses associated with Gram-negative bac-
ria has increased steadily since the introduction
antibiotics. The continuous increase in the
thogenic role of enteric organisms was largely due
Kiebsiella-Enterobacter, *Pseudomonas aeruginosa*,
l *Proteus*, although there was also an increase in
croaerophilic and group-D streptococci. Of the
cases, the correct diagnosis was made in only
%. Cholelithiasis was present in 62% of the cases.

3138 FATTY METAMORPHOSIS OF THE LIVER IN MORBID OBESITY. *(E.)* Kern, W. H.; Heger, A. H.; Payne, J. H.; DeWind, L. T. (Univ. Southern California Sch. Med., Los Angeles). *Arch. Pathol.* 96(5):342-346, 1973.

Liver biopsy specimens, obtained from 151 patients at the time of small-bowel bypass procedures for morbid obesity, were reviewed and classified according to degree of fatty metamorphosis, distribution of fatty changes, and presence of inflammation or fibrosis. Some degree of fatty metamorphosis was found in 94% of the patients, and 34% of the patients over half of the hepatic cells were involved. The changes were more severe in patients weighing over 135 kg and in males, but were unrelated to the patient's age. In 88 of 151 cases, there was slight inflammation, and in 42 cases there was slight periportal fibrosis. In 3 cases, fibrosis was consistent with early cirrhosis, and in 3 others, the pattern was characteristic of Laennec's cirrhosis. The findings suggest that the fatty metamorphosis of obesity may proceed to cirrhosis.

3139 I. PHYSIOPATHOLOGICAL PRINCIPLES FOR THE DIAGNOSIS OF JAUNDICE. *(Sp.)* Ortiz Vazquez, J. (no affil.). *Rev. Esp. Enferm. Apar. Dig.* 41(6):651-656, 1973.

3140 II. THE LABORATORY IN THE DIAGNOSIS OF JAUNDICE. *(Sp.)* Silva Pozo, J. (La Paz Munic. Sanitorium, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(6):657-668, 1973.

3141 III. RADIOLOGICAL DIAGNOSIS OF JAUNDICE. PERCUTANEOUS CHOLANGIOGRAPHY. *(Sp.)* Muro, J.; Perez-Jimenez, F. (no affil.). *Rev. Esp. Enferm. Apar. Dig.* 41(6):669-684, 1973.

3142 IV. ENDOSCOPY IN THE DIAGNOSIS OF JAUNDICE. *(Sp.)* Mino Fugarolas, G. (no affil.). *Rev. Esp. Enferm. Apar. Dig.* 41(6):685-692, 1973.

3143 V. LAPAROTOMY IN THE DIAGNOSIS OF JAUNDICE. *(Sp.)* Soleto Saez, E. (no affil.). *Rev. Esp. Enferm. Apar. Dig.* 41(6):693-696, 1973.

3144 VI. DIAGNOSIS OF HEMOLYTIC JAUNDICE. *(Sp.)* Montero Garcia, J. M. (no affil.). *Rev. Esp. Enferm. Apar. Dig.* 41(6):697-704, 1973.

3145 VII. DIAGNOSIS OF PARENCHYMAL JAUNDICE. *(Sp.)* Olmo Fabra, A. (no affil.). *Rev. Esp. Enferm. Apar. Dig.* 41(6):705-710, 1973.

3146 VIII. DIAGNOSIS OF INTRAHEPATIC AND EXTRAHEPATIC CHOLESTASIS. *(Sp.)* Ortiz Vazquez, J. (no affil.). *Rev. Esp. Enferm. Apar. Dig.* 41(6):711-718, 1973.

3147 IX. THE DIAGNOSIS OF JAUNDICE IN PREGNANCY. *(Sp.)* Mardomingo Varela (no affil.). *Rev. Esp. Enferm. Apar. Dig.* 41(6):719-728, 1973.

3148 ELECTROPHORETIC INVESTIGATION OF SERUM ESTERASE IN THE DIAGNOSIS OF LIVER DISORDERS. *(Rus.)* Surinov, B. P.; Samgina, T. S. (I. M. Sechenov 1st Moscow Med. Inst., USSR). *Lab. Delo* (8):486-488, 1973.

3149 COLLECTION AND PROCESSING OF DATA IN LIVER DISEASES ASSOCIATED WITH INCREASED TRANSAMINASE ACTIVITIES. *(Ger.)* Krebs, P.; Krebs, J. (St. Agatha Hosp., Cologne, Germany). *Med. Welt* 24(33/34):1275-1278, 1973.

3150 PEDICULAR CAVERNOMA OF THE HEPATIC ARTERY. OSTIAL STENOSIS OF THE CELIAC TRUNK AND PSEUDOCYST OF THE TAIL OF THE PANCREAS. *(Fr.)* Guntz, M.; Bigorgne, J. C.; Albaret, P.; Cardi, S. (Univ. Hosp. Ctr., Angers, France). *Sem. Hop. Paris* 50(18):1229-1231, 1974.

3151 ALPHA FETO-PROTEIN IN THE DIAGNOSIS OF PRIMARY HEPATOCARCINOMA IN SALISBURY. *(E.)* Ashworth, T. G. (Godfrey Huggins Sch. Med., Rhodesia). *Cent. Afr. J. Med.* 20(1):5-7, 1974.

3152 HEPATOMAS: A RETROSPECTIVE STUDY. *(Sp.)* Rull Segura, S.; Borda Celaya, F. (Fac. Med., Univ. Navarra, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(7):817-826, 1973.

3153 THERAPEUTIC CONSTRAINTS IN HEPATIC INSUFFICIENCY. *(E.)* Summerskill, W. H. J. (Mayo Clin., Rochester, Minn.). *Adv. Intern. Med.* 18:411-423, 1973.

3154 CONGENITAL DILATATION OF THE INTRAHEPATIC BILIARY DUCTS. *(E.)* Watts, D. R.; Lorenzo, G. A.; Beal, J. M. (Northwestern Univ. McGaw Med. Ctr., Chicago, Ill.). *Arch. Surg.* 108(4):592-598, 1974.

3155 HEPATOBLASTOMA: PATHOLOGICAL STUDIES IN A CASE. *(E.)* Kherdekar, M. S.; Kher, M. M.; Sharma, K. D. (Med. Coll., Nagpur, India). *Indian Pediatr.* 10(10):621-623, 1973.

3156 LIVER GLYCOGEN CONTENT IN MAN IN THE POSTABSORPTIVE STATE. *(E.)* Nilsson, L. H. (St. Eriks Hosp., Stockholm, Sweden). *Scand. J. Clin. Lab. Invest.* 32(4):317-323, 1973.

3157 PLASMA HALF-LIFE OF PHENYLBUTAZONE IN PATIENTS WITH IMPAIRED LIVER FUNCTION. *(E.)* Hvidberg, E. F.; Andreasen, P. B.; Ranek, L. (Rigshosp., Copenhagen, Denmark). *Clin. Pharmacol. Ther.* 15(2):171-177, 1974.

3158 HEMOBILIA SECONDARY TO FORMATION OF A FISTULA BETWEEN A PSEUDOANEURYSM IN A BRANCH OF THE RIGHT HEPATIC ARTERY AND THE BILE DUCT PREOPERATIVE DIAGNOSIS BY SELECTIVE ARTERIOGRAPHY. *(Fr.)* Dreze, C.; Lombard, R.; Jacquet, N.; Herve, P. (no affil.). *Acta Gastroenterol. Belg.* 36:397-410, 1973.

3159 LIVER DISEASE IN FATAL NARCOTISM. ROLE OF CHRONIC DISEASE AND ALCOHOL CONSUMPTION. *(E.)* Force, E. E.; Millar, J. W.; (George Washington Univ. Sch. Med., Washington, D.C.). *Arch. Pathol.* 97(3):166-169, 1974.

3160 PRIMARY HEPATIC CANCER WITH RECURRENT EPISODES OF OBSTRUCTIVE JAUNDICE AND DISTENDED GALLBLADDER. A CASE STUDY AND REVIEW OF THE LITERATURE. *(E.)* Ishikawa, I.; Kobayashi, K.; Odajima, S.; Takada, A.; Takeuchi, J. (Second Dept. Pathol., Kanazawa Univ., Japan). *Am. J. Gastroenterol.* 60(5):496-503, 1973.

3161 SYMPTOMATIC NON-PARASITIC CYSTS OF THE LIVER. *(E.)* Jones, W. L.; Mountain, J. C.; Warren, K. W. (Lahey Clin. Fdn., Boston, Mass.). *Br. J. Surg.* 61(2):118-123, 1974.

3162 ANGIOGRAPHIC EVALUATION OF PRIMARY MALIGNANT HEPATOCELLULAR TUMORS IN CHILDREN. *(E.)* Novy, S.; Wallace, S.; Medellin, H.; McBride, C. (Univ. Texas System Cancer Ctr., Houston). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 120(2):353-360, 1974.

3163 DRUG INDUCED INTRAHEPATIC CHOLESTATIC JAUNDICE: CASE REPORTS. *(E.)* Lesser, P. B. (Massachusetts Gen. Hosp., Boston). *Milit. Med.* 139(1):43-45, 1974.

3164 A FIFTEEN-YEAR EXPERIENCE WITH AUTOMOTIVE HEPATIC TRAUMA. *(E.)* Frey, C. F.; Trollope, M.; Harpster, W.; Snyder, R. (Univ. Hosp., Ann Arbor, Mich.). *J. Trauma* 13(12):1039-1049, 1973.

3165 DERMATOMYOSITIS AND LIVER. *(Ger.)* Krapp, R.; Morsches, B.; Holzmann, H.; Hoede, N.; Schneider, S. (Dermatol. Clin., Johannes Gutenberg Univ., Mainz, Germany). *Arch. Dermatol. Forsch.* 247(1):1-10, 1973.

3166 CARBOHYDRATE METABOLISM OF THE LIVER IN NORMAL MAN UNDER VARYING DIETARY CONDITION *(E.)* Nilsson, L. H.; Furst, P.; Hultman, E. (St. Eriks Hosp., Stockholm, Sweden). *Scand. J. Clin. Lab. Invest.* 32(4):331-337, 1973.

3167 INTRAHEPATIC LITHIASIS. *(Ger.)* Hess, W. (no affil.). *Helv. Chir. Acta* 41(1/2):155-158, 1974.

68 LIVER FUNCTION IN PORPHYRIA CUTANEA TARDA
DURING TREATMENT WITH CALCIUM TETACIN.
(Rus.) Pirozhenko, L. S. (Kalinin Reg.
in. Hosp., Donetsk, USSR). *Vrach. Delo*
2):18-20, 1973.

69 ANTHRACOID ABSCESS OF THE LIVER IN A CHILD:
A NEW CASE. *(Fr.)* Beauvais, P.; Gruner,
; Boccon-Gibod, L.; Brissaud, H. E. (Trousseau
sp., Paris, France). *Arch. Fr. Pediatr.*
(7):761-769, 1973.

70 THE PROPHYLAXIS AGAINST HEPATORENAL INSUFFICIENCY DEVELOPED IN PATIENTS WITH
NCER OF THE PANCREATODUODENAL REGION POSTOPERA-
/ELY. *(Rus.)* Mikhailichenko, V. A.; Mass, Y. B.;
lenko, E. P. (Med. Inst., Donetsk, USSR). *Vopr.*
col. 20(1):29-33, 1974.

71 HEMANGIOENDOTHELIAL SARCOMA OF THE LIVER
AND HEMOCHROMATOSIS. *(E.)* Sussman, E.
; Nydick, I.; Gray, G. F. (New York Hosp., N.Y.).
h Pathol. 97(1):39-42, 1974.

72 A STUDY ON THE RELATIONSHIP OF PORPHYRIA
CUTANEA TARDA AND LIVER DAMAGE. *(Ger.)*
kay, I.; Prekopa, A.; Dalmy, L.; Dan, S.; Tamasi,
(Dept. Dermatol., Univ. Debreen, Hungary). *Arch.*
matol. Forsch. 247(3):235-243, 1973.

3 CULLEN'S SIGN, A FEATURE IN LIVER DISEASE.
(E.) Mabin, T. A.; Gelfand, M. (Dept. Med., Univ. Rhodesia, Salisbury). *Br. Med. J.* 1(5906):493-494, 1974.

3174 THE BROMSULPHALEIN AND GALACTOSE TOLERANCE TESTS IN PATIENTS WITH VARIOUS LIVER DISEASES. A COMPARATIVE STUDY. *(E.)* Den Blaauwen, D. H.; Thijs, L. G. (Free Univ. Hosp., Amsterdam, Netherlands). *Acta Gastroenterol. Belg.* 36:345-375, 1973.

3175 RESECTION OF PRIMARY HEPATIC MALIGNANT LESIONS. *(E.)* Adson, M. A.; Sheedy, P. F. (Mayo Clin., Rochester, Minn.). *Arch. Surg.* 108(4):599-604, 1974.

3176 ALPHA FETOPROTEIN IN HEPATOCELLULAR DISEASE AND NEOPLASTIC DISORDERS. *(E.)* Zawadzki, Z. A.; Kraj, M. A. (Pittsburgh VA Hosp., Pa.). *Am. J. Gastroenterol.* 61(1):45-52, 1974.

3177 INTESTINAL ABSORPTION OF CALCIUM AND MAGNESIUM IN HEPATOBILIARY DISEASE IN INFANCY. *(E.)* Kobayashi, A.; Utsunomiya, T.; Ohbe, Y.; Nagashima, Y. (Natl. Child. Hosp., Tokyo, Japan). *Arch. Dis. Child.* 49(2):90-96, 1974.

See also 2777, 2914, 2916, 2919, 2920, 2921, 2923, 2948, 2950, 2956, 2959, 2962, 2965, 2972, 3092, 3126, 3235, 3261, 3266, 3281, 3294, 3298, 3301, 3354, 3358, 3361, 3364.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

8 CLINICAL IMPLICATIONS OF BILIRUBIN-ALBUMIN BINDING IN THE NEWBORN. *(E.)* Schiff,
Chan, G.; Stern, L. (Dept. Pediatrics, Univ.
erta, Edmonton, Canada). *Rev. Can. Biol.* 32:135-
, 1973.

ee methods of measuring bilirubin-albumin binding
e assessed: analysis of spectral curves; the pheno-
phophtalein or [2-(4'-hydroxybenzeneazo) benzoic
d] dye techniques; and the Sephadex G-25 gel
tration method. The latter two methods were com-
ed using sodium oleate as the competing anion. The
ults suggest that reserve albumin binding capacity,
measured by the dye techniques, is nonspecific for
irubin or any of its competing anions, and thus
ses a question relating to the interpretation of
ults obtained by the reserve albumin binding method
the clinical situation. The presence or absence of
e bilirubin in icteric sera as determined by the
hadex G-25 technique would be more meaningful in the
management of hyperbilirubinemia. In addition to
fisoxazole, salicylate, caffeine, sodium benzoate,
butamide, diazepam, furosemide, oxacillin, hydrocortisone, gentamicin, sodium meralluride, and sulfadiazine displace bilirubin from albumin. Assessment of a drug's bilirubin-albumin binding displacement properties should be included in the overall evaluation of the drug's efficacy and safety.

3179 PHOTOTHERAPY FOR HYPERBILIRUBINAEMIA IN LOW BIRTHWEIGHT INFANTS. *(E.)* Elliott, E.; Moncrieff, M. W.; George, W. H. S. (Derbyshire Children's Hosp., Derby, England). *Arch. Dis. Child.* 49(1):60-62, 1974.

Phototherapy was given to 88 babies whose birthweights were 1500-2500 g and whose serum bilirubin reached 10 mg/100 ml. Alternate babies were treated with 4000-5000 lux for a mean of 62 hr (range 24-168 hr); control cases were not treated unless bilirubin exceeded 15 mg/100 ml. No baby in the treated group developed a bilirubin above 15 mg/100 ml compared with 44% of the control cases. Despite phototherapy at the latter stage, the bilirubin in 3 (8%) of these babies reached 18 mg/100 ml but then fell rapidly.

No side effects occurred apart from overheating in a few babies. The results indicate that phototherapy is a safe and effective way of treating hyperbilirubinemia in low birthweight infants. To avoid unnecessary treatment, therapy should be started when bilirubin reaches 12 mg/100 ml, except for babies under 1500 g when it should be started at 10 mg/100 ml.

3180 BILIRUBIN METABOLISM AND INHERITABLE JAUNDICE. *(E.)* Arias, I. M. (Albert Einstein Coll. Med., New York, N.Y.). *Isr. J. Med. Sci.* 9(9/10):1419-1426, 1973.

3181 FIFTY COMMON DISEASES WITH ELEVATIONS OR DECREASES IN TOTAL SERUM BILIRUBIN. *(E.)* Casey, A. E.; Downey, E. L.; Copeland, H. (Mem. Inst. Path., Birmingham, Ala.). *Ala. J. Med. Sci.* 10(3):305-307, 1973.

3182 X. DIAGNOSIS OF JAUNDICE IN NEWBORNS. *(Sp.)* Hurtado, T. (La Paz Pediatr. Clin., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(6):729-740, 1973.

See also 2764, 2775, 2820, 2823.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

3183 JAUNDICE AFTER REPEATED EXPOSURE TO HALOTHANE: AN ANALYSIS OF REPORTS TO THE COMMITTEE ON SAFETY OF MEDICINES. *(E.)* Inman, W. H. W.; Mushin, W. W. (Committee Safety Med., London, England). *Br. Med. J.* 1(5896):5-10, 1974.

In an attempt to identify one or more of the factors associated with jaundice following exposure to halothane or other anesthetic vapors, data derived from 130 reports of jaundice occurring after anesthesia with halothane were analyzed. Jaundice occurred in 20 patients within 28 days of a single exposure to halothane, while 49 additional patients became jaundiced within 20 days of a second exposure to halothane. In the second group, the interval between halothane exposures was 28 days or less in 80% of the cases. Twenty-nine patients became jaundiced after three exposures to halothane; the interval between the first and third exposures to halothane was 14 days to 5 yr, while the interval between the third exposure and the onset of jaundice was 1 to 25 days. Sixteen patients became jaundiced after 4 to 6 exposures to halothane. The interval between the first and last exposure ranged from 16 days to 3.5 years and the interval between the last exposure and the onset of jaundice was 3 to 12 days. Among a group of 16 patients who had been exposed to halothane an unspecified number of times, jaundice developed within 28 days of the last exposure. The mean interval between the last exposure to halothane and the onset of jaundice was significantly shorter for patients exposed 2 or more times than for those exposed only once. In multiple exposure cases, the interval between the most recent exposure and the onset of jaundice did not appear to depend on the length of the period between exposures. Thus repeated exposure to halothane, especially within a short period of time, increases the incidence of jaundice, and this in turn may be fatal. Of the 66 patients whose deaths were attributed to jaundice 59 had two or more exposures to halothane.

3184 HEPATIC ACTINOMYCOSIS. *(Fr.)* Gautier-Benoit, C.; Luez, J.; Julien, C.; Cecile, J. P.; Houcke, M.; Daboust, M. (Hosp. Ctr., Lens, France). *Arch. Fr. Mal. App. Dig.* 62(8):673-677, 1973.

3185 ALLERGIC ECHINOCOCCAL HEPATITIS. *(Fr.)* Hureau, J.; Benit, C.; Picard, R.; Roux, M.; Delavierre, P. (Vaugirard Hosp., Paris, France). *Sem. Hop. Paris* 50(18):1232-1234, 1974.

3186 HEPATITIS AFTER USE OF TWO DIFFERENT FLUORINATED ANESTHETIC AGENTS. *(E.)* Sadove, M. S.; Kim, S. I. (Rush Med. Coll., Chicago, Ill.). *Anesthesia Analgesia* 53(2):336-340, 1974.

3187 HEPATOTOXICITY DUE TO PEMOLINE. REPORT OF TWO CASES. *(E.)* Tolman, K. G.; Freston, J. W.; Berenson, M. M.; Sannella, J. J. (Univ. Utah Coll. Med., Salt Lake City). *Digestion* 9(6):532-539, 1973.

See also 2760, 2916.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

3188 PLASMA EXCHANGE IN PATIENTS WITH FULMINANT HEPATIC FAILURE. *(E.)* Buckner, C. D.; Clift, R. A.; Volwiler, W.; Donohue, D. M.; Burnell, J. M.; Saunders, F. C.; Thomas, E. D. (Univ. Washington Sch. Med., Seattle). *Arch. Intern. Med.* 132(4):487-492, 1973.

Four patients with fulminant hepatic necrosis and oma were treated with 10-liter plasma exchanges aily for 3 to 36 days. Three of these patients ecovered, and two developed acute pulmonary edema ot attributable to volume overload on 2 and 4 ccasions during or following exchange. One of the urviving patients was in a coma for 37 days. During the 12-16 month follow-up period, all of the 3 urviving patients showed evidence of further active epatic disease. In two, this was a single mild pisode 17 and 56 days after plasma exchange. In he third patient, who has been followed for 27 onths, there have been continuing episodes of mild, ctive hepatitis.

189 MULTIVARIATE ANALYSIS OF SERUM PROTEIN ASSAYS IN CHRONIC HEPATITIS AND POSTNECROTIC IRRHOSIS.

(E.) Agostoni, A.; Marasini, B.; Stabiini, R.; Del Ninno E.; Pontello, M. (Inst. Med. athol., Milan, Italy). *Clin. Chem.* 20(4):428-429, 974.

re-albumin, albumin, orosomucoid, α-antirypsin, α-acroglobulin, β_{1A}-globulin, IgG, IgA, and IgM were easured by radial immunodiffusion in the serum of atients with chronic persistent hepatitis (29), ronic aggressive hepatitis (40), and postnecrotic irrhosis (29). Multivariate analysis of the data dicated that by measuring pre-albumin, albumin, d IgA in serum, chronic aggressive hepatitis and stnecrotic cirrhosis can be differentiated in 89% cases. A similar percentage was obtained with bumin, orosomucoid, and IgA, or with albumin, $_{A}$-globulin, and IgA. Discrimination based on the immunoglobulins distinguished chronic aggressive epatitis from chronic persistent hepatitis, but the umber of misclassifications was greater (23%) than the other group.

90 ABNORMAL SERUM LIPOPROTEINS IN CHOLESTATIC VIRAL HEPATITIS.

(Fr.) Picard, J.; issiere, D.; Bertrand, F. (St. Antoine Fac. Med., ris, France). *Clin. Chim. Acta* 51(1):5-12, 1974.

poproteins in serum from 30 patients with persisnt viral hepatitis and total biliary obstruction re separated by centrifugation and gel filtration. stralia antigen was present in only 40% of the paents. The relative proportions of lipid and proin components differed from those found in other ses of cholestasis. The protein ratio was ineased (20% of the micellar weight), while the ospholipid ratio was decreased (31% of the micellar ight). Cholesterol was the major constituent of ese abnormal lipoproteins (57% of the micellar ight), and 90% of the total cholesterol was prest in unesterified form. The lipoproteins had the me immunological properties as previously separed abnormal lipoproteins, as well as the same angenic characteristics caused by the presence of and C apolipopeptides and albumin. The latter mponent represented only 10-15% of the protein iety. The occurrence of at least 2 variants of normal lipoproteins was established by using the me fractionation procedure. The presence of abrmal lipoproteins in the serum of patients with lestatic viral hepatitis is associated with a significant decrease in both α-lipoproteins and β-lipoproteins. These abnormalities demonstrate the impaired synthesis of lipoproteins in these patients with hepatitis.

3191 RELATION OF ALPHA-FETOPROTEIN IN ACUTE HEPATITIS TO SEVERITY AND PROGNOSIS.

(E.) Karvountzis, G. G.; Redeker, A. G. (Univ. Southern California Sch. Med., Los Angeles). *Ann. Intern. Med.* 80(2):156-160, 1974.

Sera from 104 patients with acute viral hepatitis of variable severity were tested for α-fetoprotein by counterelectrophoresis. Among 51 patients with fulminant hepatitis and coma, α-fetoprotein was detected in 17 (85%) of 20 who survived and in only 12 (38.7%) of 31 fatal cases. Among 53 patients without coma, α-fetoprotein was detected in 16. In nonfatal fulminant hepatitis, the frequency of α-fetoprotein positivity increased with increasing duration of coma: in specimens obtained during days 1 and 2 of coma, α-fetoprotein was found in 5 of 13, but when coma persisted for more than 4 days, α-fetoprotein was present in all 11 patients. In the fatal cases of fulminant hepatitis, the frequency of α-fetoprotein positivity was not related to duration of coma. Among the patients with nonfulminant hepatitis, α-fetoprotein was distinctly correlated with the severity of the hepatitis: it was found in 77% of patients with prothrombin levels less than 20% and in only 4.3% of patients in whom prothrombin levels were never less than 60%. The detection of α-fetoprotein in the 16 patients with nonfulminant hepatitis was invariably followed by recovery without progression to hepatic failure, despite the low prothrombin levels or the presence of ascites. The high levels of α-fetoprotein observed in severe forms of hepatitis apparently reflected rapid liver cell regeneration following extensive hepatic necrosis. Sensitive means of assessing regenerative activity during coma would be of prognostic value and useful in the management of acute hepatic failure by radical measures such as hepatic transplantation.

3192 EXCHANGE TRANSFUSION IN THE TREATMENT OF ACUTE SEVERE LIVER FAILURE (WITH HEPATIC COMA) DEVELOPING IN VIRAL HEPATITIS. (EXPERIENCE WITH 80 PATIENTS, 42 OF WHOM WERE GIVEN EXCHANGE TRANSFUSIONS).

(Rum.) Voiculescu, M.; Paun, L.; Dancu, I.; Pavlovici, M. (no affil.). *Med. Interna (Bucur.)* 25(8):981-991, 1973.

Of 80 patients (40 men and 40 women) who developed fulminating liver failure and stage III or IV hepatic coma during viral hepatitis, 38 received standard therapy consisting of glucose infusions, injections of vitamin B complex and vitamin K_1, neomycin (1.4 g p.o.), and hydrocortisone hemisuccinate infusions (600-800 mg/day i.v.). In addition, the remaining 42 patients received exchange transfusions. All but 11 of these patients were under 45 yr old. Exchange transfusions were performed with matched citrated blood by exchanging 5 liters every 2-3 hr so that a total of 20 liters were used. In this way, 60-70% of the circulating blood was replaced. For every 500 ml of blood, one vial of calcium gluconate was administered. Of these 80 patients, 18 (22.5%) recovered: 12 of the 42 (28.5%) given both standard therapy and exchange transfusions and 6 of the 38 (16%) given standard therapy alone. The mean survival time was 3 days 2 hr among those given standard therapy and 4 days 10 hr among those receiving both standard therapy and exchange transfusions. The recovery rate was highest among patients aged 15-30 (15 of 52), among those who developed hepatic coma during the first 7 days after the onset of jaundice (17 of 62), and among those who had prothrombin levels of 30-50% (3 of 3). Because of its effectiveness and simplicity, exchange transfusion is recommended for the treatment of fulminating liver failure and hepatic coma.

3193 THE DISTRIBUTION OF SUBTYPES IN VARIOUS SWEDISH POPULATIONS POSITIVE FOR HEPATITIS B ANTIGEN. *(E.)* Nordenfelt, E.; Le Bouvier, G. (Dept. Med. Microbiol., Univ. Lund, Sweden). *Scand. J. Infect. Dis.* 5(4):279-283, 1973.

Sera from 7 populations positive for hepatitis B antigen (HBAg) were investigated with respect to their antigenic subspecifities. With 2 exceptions, sera from 32 patients, 4 relatives, and 7 staff members infected in epidemics at 2 dialysis units were associated with HBAg (Y) and by inference with hepatitis B virus of subtype Y. The same subtype was found among 10 addicts and 88 of 104 patients with acute hepatitis. Subtype D was predominant among blood donors (10 of 13), and was the only type found among 43 mentally retarded patients and 5 patients who became infected in an epidemic at a home for the aged. Of 5 adopted children, 2 from Korea were carrying HBAg (D) and 3 from India, HBAg (Y). These findings confirm earlier investigations showing that both D and Y subtypes are found in Western societies, but with uneven distribution, reflecting the epidemic and endemic spread of the different genotypes of hepatitis virus. Of potential epidemiological interest is the finding of a new HBAg variant carrying both D and Y specificities on the same particles. This antigen was found in serum from a mentally retarded 49-yr-old male patient. Of 35 sera tested with respect to w and r, 33 were w+. The 2 r+ sera belonged to the 2 adopted Korean children.

3194 A STUDY OF THE RELATIONSHIP OF VIRUS-LIKE PARTICLES AND AUSTRALIA ANTIGEN IN LIVER. *(E.)* Huang, S. N.; Groh, V.; Beaudoin, J. G.; Dauphinee, W. D.; Gutterman, R. D.; Morehouse, D. D.; Aronoff, A.; Gault, H. (Roy. Victoria Hosp., Montreal, Canada). *Hum. Pathol.* 5(2):209-222, 1974.

The ultrastructural and antigenic characteristics of Australia antigen (HBAg)-associated liver particles and their relation to serum HBAg were studied. Liver tissues were obtained from 29 patients with type B hepatitis. Of these patients 17 were renal tranplant recipients with chronic liver disease; all had persistent Australia antigenemia. The remaining 12 patients had acute viral hepatitis (6), chronic active hepatitis (3), and malignant lymphoma and chronic active hepatitis (3). Electron microscopy showed characteristic noncoated virus-like particles in liver cell nuclei in all cases. In some cases, such as renal transplant recipients with chronic active hepatitis, aggregates of the intranuclear particles caused rarefaction of the nucleoplasm. By contrast, only a few particles were seen in liver cell nucleus in patients with acute viral hepatitis. The noncoated particles were also present in the cytoplasm of liver cells from renal transplant patients. In 21 cases liver cells showed marked proliferation of smooth surfaced endoplasmic reticulum, the cisternae of which contained coated particles morphologically identical to Dane particles in serum. In addition, the cisternae of the endoplasmic reticulum contained peculiar filaments and their probable cross sections with an owl eye appearance. The outer covering of the coated particles was continuous with the filaments, suggesting the latter were the crystalloid coat material. Phosphotungstic acid negative stain of liver tissue homogenates and fractionates provided an intermediate linkage in morphological interpretation of tissue and smear findings. Evidence indicated the hepatic origin of the HBAg particles. Immunoagglutination electron microscopy confirmed that HBAg particles in tissue homogenates and sera were antigenically identical; the noncoated particle although morphologically similar to the core component of Dane particles, appeared antigenically different from HBAg coat material. These observations support the concept that Dane particles have dual antigenic specificities. Pure core particles were absent in serum, and it is suggested that these particles are released in clusters that are readily phagocytosed by leucocytes.

3195 SERUM ALPHA-FETOPROTEIN LEVELS IN ACUTE VIRAL HEPATITIS. *(E.)* Kew, M. C.; Purves, L. R.; Bersohn, I. (Dept. Med. Univ. Witwatersrand, South Africa). *Gut* 14(12):939-942, 1973.

Serum α-fetoprotein levels were measured serially by radioimmunoassay in 28 black and 4 white patients (17 males, 15 females; aged 4 months to 43 yr) with acute viral hepatitis. With 1 exception, the levels were increased during the course of the illness. Raised concentrations of the protein occurred almost equally in patients with and without the hepatitis-B antigen. In the majority of patients the rise was modest but in 7 levels greater than 1000 ng/ml were reached. Six of these 7 patients were under age 12 yr. In 8 patients the concentration increased as the SGPT level, used as an index of hepatocyte damage, was returning to normal, a pattern which favored increased synthesis of the protein during hepatocellular regeneration. In the remainder, the α-fetoprotein level paralleled that of SGPT, suggesting rather an acute-phase reaction to liver injury.

3196 A STUDY OF HEPATIC DISEASE IN AUSTRALIA ANTIGEN AND ANTIBODY-POSITIVE BLOOD DONORS. *(E.)* Russell, R. I.; Goldberg, D. M.; Allan, J. G.; MacSween, R. N. M.; Wallace, J. (Roy. Infirm., Glasgow, Scotland). *Am. J. Dig. Dis.* 19(2):113-121, 1974.

 total of 39 blood donors (28 males and 11 females)
ound on routine testing to be Australia antigen
HB Ag) or antibody (HB Ab) positive, were studied
or evidence of hepatic disease. Seven had severe
nd 5 had minor biochemical abnormalities which were
estricted to serum enzymes, notably isocitrate de-
ydrogenase, glutamate dehydrogenase, adenosine dea-
inase, guanase, and SGOT; 8 of these 12 subjects had
B Ag and 4 HB Ab. Four had serum cholesterol eleva-
ions but no other biochemical abnormalities. In 23
ubjects biochemistry was normal. Of 11 subjects who
nderwent hepatic biopsy, 3 were found to have evid-
nce of chronic persistent hepatitis. Two of these
 had HB Ag and 1 had HB Ab. Although 2 of the 3 had
evere biochemical abnormalities, 1 had normal bio-
hemistry. Minor histological abnormalities were
ound in 4 other donors without biochemical abnor-
alities. The results suggest that subjects with
ersistently positive tests for HB Ag or HB Ab may
ave chronic hepatic disease. Close follow-up
 blood donors and other subjects found to have
ositive tests is thus indicated. Normal biochemical
indings do not exclude abnormal hepatic histology.

97 PERMEABILITY OF THE INTESTINE TO ^{131}I-LA-
BELED ALBUMIN IN PATIENTS WITH VIRAL HEPA-
TIS. *(Pol.)* Szpakowicz, T.; Trembaczowski, E.;
iubinska, E. (Acad. Med., Bialystok, Poland).
l. Tyg. Lek. 28(47):1854-1857, 1973.

98 GENETIC FACTORS IN HEPATITIS. *(E.)*
Anonymous. *Nature* 248(5497):377, 1974.

99 AN OUTBREAK OF HEPATITIS-A ASSOCIATED
WITH RECREATIONAL LAKE WATER. *(E.)*
yan, J. A.; Lehmann, J. D.; Setiady, I. F.; Hatch,
 H. (Viral Dis. Br., Bureau Epidemiol., CDC,
lanta, Ga.). *Am. J. Epidemiol.* 99(2):145-154,
74.

00 ACUTE LIVER DISEASE WITH FATAL OUTCOME
CAUSED BY CYTOMEGALOVIRUS INFECTION FOL-
WING MULTIPLE BLOOD TRANSFUSIONS. *(Ger.)* Peller,
; Goetz, O. (Children's Clin., Univ. Munich,
rmany). *Mschr. Kinderheilk.* 122(1):40-43, 1974.

01 DISORDERS IN PLATELET FUNCTION DURING THE
ICTERIC PHASE OF ACUTE VIRAL HEPATITIS.
er.) Podolsak, B.; Stroder, J. (Pediatr. Clin.,
iv. Wurzburg, Germany). *Z. Kinderheilk.* 116(13):
3-176, 1974.

02 POSSIBLE REASONS FOR THE DEVELOPMENT OF
MORPHOLOGICAL CHANGES IN THE LIVER IN
AL HEPATITIS. *(Rus.)* Tsinzerling, A. V. (Lenin-
d Pediatr. Med. Inst., USSR). *Arkh. Patol*
9):11-17, 1973.

03 LIVER DETOXIFICATION AFTER INFECTIOUS
HEPATITIS FOLLOWED BY MEANS OF ^{131}I-o-
OBENZOIC ACID GLUCURONIDATION. *(Cz.)* Skalova, E.;
Dohnalek, J.; Eysselt, M.; Polaskova, A. (Med. Fac., J. E. Purkyne Univ., Brno, Czechoslovakia). *Vnitr. Lek.* 19(5):433-436, 1973.

3204 DETERMINATION OF SERUM ADENOSINE DEAMINASE ACTIVITY IN PATIENTS WITH VIRAL HEPATITIS. *(Rus.)* Puni, I. N.; Denisenko, L. N. (Leningrad Med. Inst. Sanitation Hyg., USSR). *Lab. Delo* (8):489-490, 1973.

3205 EPIDEMIOLOGY AND PREVENTION OF VIRAL HEPATITIS IN HOSPITALS. *(Fr.)* Durgeat, J. (Hemodialysis, Catheterization Ctr., Paris, France). *Arch. Mal. Prof.* 34(12):776-779, 1973.

3206 EXAMINATION OF THE LIPOLYTIC FUNCTION OF THE PANCREAS WITH ^{131}I-TRIOLEIN IN ACUTE VIRAL HEPATITIS. *(Rum.)* Negomireanu, T.; Szantay, I. (Clin. Infectious Dis., Cluj, Rumania). *Med. Interna (Bucur.)* 25(5):619-623, 1973.

3207 PROSPECTIVE INVESTIGATION IN THE INCIDENCE OF HEPATITIS FOLLOWING OPEN HEART SURGERY WITH AUSTRALIA ANTIGEN-NEGATIVE BLOOD TRANSFUSIONS. *(Ger.)* Schlaak, M.; Lehmann, H. (1st Med. Clin., Univ. Kiel, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1405-1407, 1972.

3208 CHANGES IN SERUM RETINOL-BINDING PROTEIN IN HEPATITIS. *(Ger.)* Kindler, U. (1st Med. Clin., Univ. Dusseldorf, Germany). *(Verh. Dtsch. Ges. Inn. Med.* 78:1356-1358, 1972.

3209 AUSTRALIA ANTIGEN SURVEY IN HUNGARY. IV. ANTIBODIES TO TWEEN-80-TREATED AUSTRALIA ANTIGEN AND TO ALLOGENEIC LIVER FRACTIONS IN PATIENTS WITH HEPATITIS. *(E.)* Hollos, I.; Szecsey, G.; Novak, E.; Laszlo, B.; Kiss, S.; Penke, Z.; Koszeghy, Z.; Kendrey, G. (Natl. Inst. Public Health, Budapest, Hungary). *Acta Microbiol. Acad. Sci. Hung.* 20(3):227-235, 1973.

3210 VIRAL HEPATITIS IN AMERICAN MISSIONARIES ABROAD. *(E.)* Anonymous. *J. Infect. Dis.* 129(2):227-229, 1974.

3211 HOLLOW HEPATITIS B ANTIGEN IN A CASE OF VIRAL HEPATITIS. *(E.)* Ackermann, H. W.; Cherchel, G. L.; Valet, J. P.; Matte, J. (Fac. Med. Laval Univ., Quebec, Canada). *J. Infect. Dis.* 129(2):213-214, 1974.

3212 AUSTRALIA ANTIGEN IN CHRONIC HEPATITIS, CIRRHOSIS, AND ACUTE VIRAL HEPATITIS WITH COMPLETE RECOVERY. *(Rum.)* Buligescu, L.; Lenkei, R.; Dumitriu, M.; Focseneanu, V. (Fundeni Med. Clin., Bucharest, Rumania). *Med. Interna (Bucur.)* 25(6):699-710, 1973.

3213 VIRAL HEPATITIS. *(E.)* Grady, G. F. (Tufts Univ. Sch. Med., Boston, Mass.). *Advances Intern. Med.* 18:95-116, 1973.

See also 2935, 2936, 2943, 2963, 3218.

LIVER AND BILIARY TRACT

Chronic Hepatitis

3214 TREATMENT OF ACTIVE CHRONIC HEPATITIS WITH CYCLOPHOSPHAMIDE. *(E.)* Naccarato, R.; Farini, R.; Chiaramonte, M.; Fagiolo, U.; Sturniolo, G. C. (Inst. Med. Pathol., Univ. Padua, Italy). *Postgrad. Med. J.* 50:16-24, 1974.

Clinical, biochemical, and immunological changes in 20 patients with active chronic hepatitis were observed during and after treatment with cyclophosphamide and/or corticosteroids. One group of 10 patients received cyclophosphamide alone (200 mg/day i.v. for a total of 5-6 g followed, after a 1-3 months discontinuation of treatment, by 100-150 mg/day p.o. or i.v. for a total of 4-5 g). A second group of 4 patients was treated with cyclophosphamide after prednisolone therapy (15-20 mg/day for 2-3 months). A third group of 6 patients received only corticosteroid therapy (15-20 mg/day prednisolone or 16-24 mg/day triamcinolone in 2-3 month cycles). In the 3 groups of patients there was a gradual decrease in asthenia and dyspepsia, a decrease or disappearance of arthromyalgia, and a return to normal of bowel movements and diuresis. The improvement was greatest in patients treated with cyclophosphamide alone. Patients treated with cyclophosphamide showed swift regression or disappearance or jaundice within the first month of treatment, while in the other two groups this decrease was slower or absent. In the cyclophosphamide group, total serum bilirubin, SGOT, SGPT, and serum ornithine carbamyl transferase normalized within 2 months after the institution of treatment. Blood albumin and gamma-globulin levels and some immunological findings (serum immunoglobulins, serum antismooth muscle, antiglomerular basal membrane, and antigamma-globulin) showed periodic variations during the course of the disease in all 3 groups. Serum mitochondrial antibodies disappeared from blood in all patients treated with cyclophosphamide. Cyclophosphamide gave the best results in patients with chronic aggressive hepatitis type A. The histological picture remained unchanged after treatment.

3215 HEPATOGRAPHY PATTERNS FOLLOWING RECTAL ADMINISTRATION OF RADIOIODINE AS SEEN IN CHRONIC LIVER DISEASE AND OTHER LIVER DISORDERS. *(E.)* Steinberg, M.; Marner, I.-L.; Waever Rasmussen, J. (Odense Univ. Hosp., Denmark). *Scand. J. Gastroenterol.* 9(1):73-79, 1974.

Following rectal instillation of ^{131}I-labeled NaI (40 µCi), liver and plasma activity-time curves were analyzed in 38 patients. Of these patients, 10 were normal controls, 18 had chronic liver disease, 6 had liver metastases, and 4 had miscellaneous liver abnormalities. Two basic hepatography patterns were found. Type I, seen in all normal controls, indicates direct rectum to liver blood flow *via* the portal vein. Type II represents portal-systemic collateral blood flow and was seen in 9 of the 18 patients with chronic liver disease. Of the patients with liver metastases, Type I was seen in 3 cases, a varient of Type I in 2 cases, and Type II in a single case. The results indicate that hepatography is useful in demonstrating portal hypertension, but is of little value in the study of liver metastases.

3216 CHRONIC LIVER DISEASE: DIFFERENCES IN AUT IMMUNE SEROLOGICAL REACTIONS BETWEEN AUSTR LIANS AND ASIANS. *(E.)* Whittingham, S.; Mackay, I. R.; Thanabalasundrum, R. S.; Chuttani, H. K.; Manjuran, R.; Seah, C. S.; Yu, M.; Viranuvatti, V. (Roy. Melbourne Hosp., Victoria, Australia). *Br. Med. J.* 4:517-519, 1973.

A serological study of 164 patients with chronic liver disease from Australia, Ceylon, India, Singapore, and Thailand is described. There is a high prevalence of autoantibodies associated with chronic idiopathic liver disease among Australians (55%) com pared with those from the Asian countries (0-14%). The levels of these autoantibodies were also high among Australians in that antinuclear antibodies ranged up to 167 u/ml and smooth muscle antibodies up to a titer of 512; the maximum level of antinuclear antibodies among the Asian patients was 167 u/ml and the highest titer of smooth muscle antibodi was 128. In none of the groups was there a high prevalence of hepatitis B antigen. The main explana tions for differences in prevalence and type of liver diseases among racial groups would include differing exposure or susceptibility to infectious agents or toxic agents, nutritional differences, and inter-racial genetic differences. Genetic differences expressed through histocompatibility antigens could be a factor accounting for differences in racial prevalence of disease in general, and for the autoimmune type of active chronic hepatitis in particular.

3217 THE ULTRASTRUCTURE OF AUSTRALIA ANTIGEN IN THE PRESENCE AND THE ABSENCE OF SPECIFIC ANTIBODIES. *(E.)* Muscatello, U.; Bianchi, F. B.; Pisi, E. (Inst. Gen. Pathol., Univ. Modena, Italy). *Br. J. Exp. Pathol.* 54(6):658-664, 1973.

The technical conditions which allow high resolution electron microscopy of Australia (Au) antigen were investigated. Reliable and consistent results were btained using uranyl acetate as the negative stain, t pH 4.5 Au antigen may have a tubular or 2 round orms. Tubular forms vary in length from 40-400 nm ut have a constant diameter of about 21 nm. The ound forms are distinguished on the basis of their ean diameter, smaller forms having a mean diameter f 21 nm and large forms, a diameter of 42 nm. The maller round forms apparently derive from the tubular orms through a process of terminal splitting; the arger forms may originate from the same tubular orms through a process involving a complicated rerrangement of structural subunits. In the absence f antibody, Au subunits are regularly arranged in a elical lattice, as shown by the image analysis obained by optical diffraction. After reaction with pecific antibody, the geometry of the lattice is ess evident or even totally obscured due to the resence of material attached to the particle surace. This material consists of antibody molecules aving the dimensions and shape typical of IgG. At igher antibody concentrations, clumps of antigen articles are formed. It is suggested that changes n the elementary structure of subunits be used as marker for the existence of an antigen-antibody eaction. The formation of clumps is a less reliable arker because of the occurrence of nonspecific gglutination with the negative staining procedure. u antigen particles prepared from the sera of 5 atients with chronic hepatitis had antibodies bound o their surface. Whether this is a consistent feaure of active chronic hepatitis is not clear at resent.

218 ANTICOMPLEMENTARY HEPATITIS B ANTIGEN. *(E.)* Gitnick, G. L.; Summerskill, W. H. J.; Soloway, R. D.; Ritman, S.; Schoenfield, L. J. (Dept. ed. UCLA Ctr. Health Sci., Los Angeles, Calif.). rch. *Intern. Med.* 132(4):502-505, 1973.

The prognostic importance of anticomplementary hepatitis B antigen (HB Ag) tests was assessed in 63 patients with chronic active liver disease in a prospective controlled treatment trial. The patients were randomly assigned to groups receiving placebo, prednisone (60 mg/day for 4 weeks, then 20 mg/day), azathioprine (100 mg/day), or a combination of prednisone (10 mg/day) and azathioprine (50 mg/day). A positive result was correlated with poor prognosis and failure of treatment in 11 of 18 patients receiving placebo or azathioprine. In contrast, marked improvement in prognosis occurred in 12 of 14 patients receiving prednisone or the prednisone-azathioprine combination. Patients with anticomplementary assays had a worse prognosis than did those whose sera were either HB Ag-positive or HB Ag-negative. Lupus erythematosus and smooth muscle antibody tests did not distinguish subgroups or influence response to treatment or prognosis. Among patients with chronic active liver disease, an anticomplementary assay indicates a more urgent need for prednisone treatment.

3219 AUSTRALIA ANTIGEN IN CHRONIC LIVER DISEASES. *(E.)* Prakash, C.; Kumar, R.; Lal, M. M. (Med. Coll., Haryana, India). *J. Assoc. Physicians India* 21(10):855-860, 1973.

3220 CERULOPLASMIN IN CHRONIC LIVER DISEASE. *(Rum.)* Mardare, G.; Strat, C.; Dragan, M.; Terek, C.; Pandele, G.; Boingeanu, A. (Inst. Med. Pharm., Iasi, Rumania). *Med. Interna (Bucur.)* 25(2):229-236, 1973.

3221 SULFONAMIDE-INDUCED CHRONIC LIVER DISEASE. *(E.)* Tonder, M.; Nordoy, A.; Elgjo, K. (Univ. Hosp., Tromso, Norway). *Scand. J. Gastroenterol.* 9(1):93-96, 1974.

3222 TREATMENT OF CHRONIC HEPATITIS WITH IMMUNOSUPPRESSANTS AND D-PENICILLAMINE. *(Ger.)* Wallnofer, H.; Hanusch, M. (Gen. Public Hosp., Vocklabruck, Austria). *Wien. Med. Wochenschr.* 123(25):402-408, 1973.

See also 2936, 3212, 3227.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

3223 VITAMIN B_6 METABOLISM IN CHRONIC ALCOHOL ABUSE: PYRIDOXAL PHOSPHATE LEVELS IN PLASMA AND THE EFFECTS OF ACETALDEHYDE ON PYRIDOXAL PHOSPHATE SYNTHESIS AND DEGRADATION IN HUMAN ERYTHROCYTES. *(E.)* Lumeng, L.; Li, T.-K. (Indiana Univ. Sch. Med., Indianapolis). *J. Clin. Invest.* 53(3): 693-704, 1974.

Vitamin B_6 metabolism in chronic alcoholic abuse was studied by comparing plasma pyridoxal-5'-phosphate (PLP) levels in 66 male alcoholics (aged 18-68 yr) with those of 99 healthy male controls. All the alcoholics were free of hematologic and liver disorders. In controls plasma PLP concentrations ranged from 5 to 26.3 ng/ml. The range for the alcoholic group was 1.9 to 13.1 ng/ml, with 35 subjects having plasma PLP values below 5 ng/ml. These data indicate a high incidence of deranged PLP metabolism in alcoholic patients even when hepatic and hematologic abnormalities are absent. Low plasma PLP levels in alcoholics were not accompanied by decreased pyridoxal kinase and pyridoxine phosphate oxidase activities in erythrocytes. Further studies with erythrocytes demonstrated that the cellular content of PLP is determined not only by the activities of these PLP-synthesizing enzymes but also by the activity of a phosphate-sensitive, membrane-associated, neutral phosphatase which hydrolyzes phosphorylated vitamin B_6 metabolites. Acetaldehyde (0.05-1 mM), but not ethanol (to 70 mM), impaired the net formation of PLP from pyridoxal, pyridoxine, and pyridoxine phosphate by erythrocytes. This effect of acetaldehyde was abolished when the B_6-phosphate phosphatase activity was inhibited by 80 mM phosphate. Experiments with broken cell preparations confirmed that the action of acetaldehyde is mediated by the phosphatase, resulting in accelerated degradation of the phosphorylated vitamin B_6 metabolites in erythrocytes.

3224 LIVER LIPID CONTENT IN ALCOHOLICS. *(E.)* Lundquist, A.; Wiebe, T.; Belfrage, P. (Univ. Hosp., Lund, Sweden). *Acta Med. Scand.* 194(6):501-504, 1973.

Liver biopsy specimens from 51 alcoholics (49 males and 2 females, aged 48 ± 11 yr) obtained with a 0.7 mm needle have been analyzed for lipid content and these values have been compared with the evaluation of visible fat in smears from the same biopsy specimens. Large variations in liver lipid concentrations have been found, ranging from one group, 24% of total, with fat within normal limits to a few individuals with a 100-fold increase in liver lipid concentration. This variation is partly explained by varying abstinence times before biopsy. Morphologically liver lipid levels were classified from 0 to 3; 0 indicating no or only a few small vacuoles, 1 indicating small vacuoles in a minority of the cells, 2 indicating small or large vacuoles in a majority of the cells, and 3 indicating small and/or large vacuoles in almost every hepatocyte. For routine purposes, this classification of liver fat in fine-needle biopsy specimens allows adequate estimation of liver lipid levels. Serum transaminases and bilirubin were the only laboratory data found to co-vary with liver fat.

3225 ISOENZYME PATTERNS OF SERUM ALKALINE PHOSPHATASE IN ETHANOL-INDUCED LIVER INJURY. *(E.)* Brohult, J.; Sundblad, L. (Med. Dept. IV., Sodersjukhuset, Stockholm, Sweden). *Acta Med. Scand.* 194(6):497-499, 1973.

Abnormal agar gel electrophoretic patterns of alkaline phosphatase isoenzymes have been demonstrated in 11 out of 16 male chronic alcoholics (aged 35-60 yr) in spite of normal or borderline routine liver tests including total alkaline phosphatase, SGOT, SGPT, and bilirubin. The abnormality consisted of the presence of a fast-moving alpha$_1$-fraction known to be related to hepatic disease, preferably of an obstructive type. The alpha$_1$-fraction averaged 9.4 U/liter in the 11 cases and constituted 8-24% (mean 13%) of the total alkaline phosphatase activity. The presence of alpha$_1$-alkaline phosphatase appears to be a more sensitive indicator of ethanol-induced liver damage than LDH-5 and ornithine carbamoyl transferase. These results indicate that this test may be a very sensitive aid in diagnosing alcohol abuse. The data reveal that there are stages of ethanol-induced liver involvement when alpha$_1$-alkaline phosphatase and LDH-5 are increased in spite of normal values for other liver function tests.

3226 EFFECTS OF ETHANOL UPON LIPID METABOLISM. *(E.)* Lieber, C. S. (VA Hosp., Bronx, N.Y.). *Lipids* 9(2):103-116, 1974.

See also 2753, 2765, 2767, 2768, 2801, 3057.

LIVER AND BILIARY TRACT

Cirrhosis

3227 HIGH PREVALENCE OF SEROIMMUNOLOGIC ABNORMALITIES IN RELATIVES OF PATIENTS WITH ACTIVE CHRONIC HEPATITIS OR BILIARY CIRRHOSIS. *(E.)* Galbraith, R. M.; Smith, M.; Mackenzie, R. M.; Tee, D. E.; Doniach, D.; Williams, R. (King's Coll. Hosp., London, England). *N. Engl. J. Med.* 290(2):63-69, 1974.

To determine the familial prevalance of serologic abnormalities, immunoglobulin disturbances, and biochemical evidence of liver dysfunction, 260 relatives of patients with chronic hepatitis (24 women and 9 men, aged 13-80 yr) or primary biliary cirrhosis (21 women and 1 man, aged 30-80 yr) were studied. Mitochondrial, smooth-muscle, and nuclear antibodies were more frequent among relatives of these patients than in controls matched for age and sex. Abnormal immunoglobulin levels occurred in almost half the relatives, and 71% had some immunologic disturbance. In addition, elevated alkaline phosphatase levels and hypergammaglobulinemia were common, the latter being more frequent in relatives of patients with chronic hepatitis (34%) than in relatives of patients with biliary cirrhosis (9.3%). Furthermore, in 3 of the 55 families studied, 2 or more members had cirrhosis. These findings suggest a similar genetic predisposition to immunologic abnormalities among the families of patients with these 2 diseases. The translation of such predisposition into clinical liver disease is probably related to environmental factors.

3228 SINUSOIDAL STENOSIS--THE CAUSATIVE ANATOMICAL LESION OF PORTAL HYPERTENSION. *(E.)* Nakata, K.; Uehara, Y.; Wada, K.; Fujimoto, K.; Fujikawa, Y.; Itaya, H. (Osaka Med. Coll., Japan). *Acta Pathol. Jap.* 23(2):225-236, 1973.

To clarify the anatomical lesion responsible for he development of portal hypertension without vasular occlusion, portal pressure measurements in 5 patients were correlated with histological findngs in liver biopsies. The 35 patients consisted f 11 with fibrosis of the liver and 24 with cirhosis. Controls with intact livers included 4 paients with gastric ulcer, 1 with duodenal ulcer, with cholelithiasis, and 5 with gastric cancer ithout hepatic metastasis. Portal venous pressure veraged 328.6 mm H_2O in liver fibrosis and 384 mm $_2O$ in cirrhosis, compared with 108.3 mm H_2O in ontrols. The mean diameter of hepatic cells inreased from a control value of 19.41μ to 22.55μ n fibrosis and 23.24μ in cirrhosis, while the perentage of sinusoidal space within a square unit of iver lobule decreased from 10.66% in controls to .35% and 5.82%, resp., in fibrosis and cirrhosis. here was a close inverse correlation between the egree of sinusoidal stenosis and the portal hyperension. Vascular lesions of both the portal venous ree and the hepatic venous tree were minimal. hese results indicate that sinusoidal stenosis is he most important anatomical lesion leading to ortal hypertension.

229 HYPERDYNAMIC STATES AND THE PHYSIOLOGIC DETERMINANTS OF SURVIVAL IN PATIENTS WITH IRRHOSIS AND PORTAL HYPERTENSION. *(E.)* Seigel, . H.; Goldwyn, R. M.; Farrell, E. J.; Gallin, P.; riedman, H. P. (Buffalo Gen. Hosp., N.Y.). *Arch. urg.* 108(3):282-292, 1974.

he ability of the cirrhotic patient to withstand he acute stress of variceal hemorrhage or necessary ortal decompressive surgery is related to the adeuacy of the cardiovascular and cardiorespiratory inerrelationships. A multivariable statistical analyis of 17 variables in 28 patients with cirrhotic iver disease and 81 controls was performed. Three ifferent hyperdynamic cardiovascular states were ound in the cirrhotic patients: a control hyperynamic state characterized by an increased cardiac utput, without evidence of abnormal peripheral vasular or pulmonary dysfunction; a balanced hyperdynamc response to stress in which a further increase n cardiac output is usually compensated for by an dequate increase in myocardial contractility and xygen consumption; and an unbalanced hyperdynamic tress state in which there is evidence of severe eripheral vascular abnormality, impaired oxygen exraction, and a tendency to the development of highutput cardiac failure. The use of inotropic support n the preoperative or immediated postoperative cirrhotc patient should be considered based on the cardiac ndex, the cardiac mixing time, the arteriovenous xygen gradient, and the ratio of alveolar-arterial xygen gradient and arterial PO_2.

230 TRANSTHORACIC LIGATION OF BLEEDING ESOPHAGEAL VARICES IN PATIENTS WITH INTRAHEPATIC ORTAL OBSTRUCTION. *(E.)* Ottinger, L. W.; Moncure, . C. (Harvard Med. Sch., Boston, Mass.). *Ann. Surg.* 79(1):35-38, 1974.

n a group of 72 patients with intrahepatic portal bstruction undergoing transthoracic ligation of esophageal varices for active hemorrhage as the immediate procedure to control bleeding, the mortality rate was 50%. The success of the procedure in controlling hemorrhage and allowing the patient to come to the definitive portosystemic shunt directly paralleled hepatic functional reserve. Of the 72 patients, 13 were classified as Child Class A patients, (7 with Laennec's and 6 with postnecrotic cirrhosis) for serum bilirubin below 2.0 mgm%, serum albumin over 3.5 gm%, no ascites, no neurological disorder, and excellent nutrition were the prevailing conditions. A further 29 were classed as Class B patients (17 with Laennec's and 12 with postnecrotic cirrhosis) for serum bilirubin 2.0-3.0 mgm%, serum albumin 3.0-3.5 gm%, easily controlled ascites, minimal neurological disorder, and good nutrition were the prevailing conditions. The remaining 30 were classed as Class C patients (20 with Laennec's and 10 with postnecrotic cirrhosis) for serum bilirubin over 3.0 mgm%, serum albumin under 3.0 gm%, poorly controlled ascites, advanced neurological disorders and poor nutrition prevailed. The procedure was uniformly successful in Child Class A patients, 55% successful in Class B patients, and only 10% successful in Class C patients. Of these 72 patients, 9 (12½) developed fistulae from the esophageal suture line. The incidence increased with increasing severity of liver decompensation and the complication was invariably fatal.

3231 TREATMENT OF STABILIZED LIVER CIRRHOSIS BY DEHYDROEPIANDROSTERONE SULPHATE. I. EVALUATION OF PRINCIPAL BIOCHEMICAL TESTS AS A WHOLE. *(E.)* Fassati, P.; Fassati, M.; Sonka, J.; Josifko, M. (Dist. Inst. Pub. Hlth., Prague, Czechoslovakia). *Agressologie* 14(4):259-268, 1973.

Dehydroepiandrosterone sulphate (80 mg/day) for 6 months to 39 patients with stabilized liver cirrhosis led to a significant improvement of the bromsulphalein test, to an elevation of serum albumin and a decrease of globulins, especially gamma-globulin levels, to a reduction of cholesterolemia and beta-lipoproteinemia. The flocculation tests improved or remained unchanged. Both current aminotransferases (SGPT and SGOT) and total serum bilirubin showed an insignificant improvement. The only test which seemed to deteriorate was serum alkaline phosphatase. It is suggested that the favorable effect of dehydroepiandrosterone sulphate used in liver cirrhosis may be due to the metabolic role of this steroid which is a potent inhibitor of glucose-6-phosphate dehydrogenase and 11-beta-hydroxylase. The tendency toward enhanced synthesis of lipids, aldosterone and different proteins found in the chronic inflammatory process of liver injury may be corrected by the resulting metabolic effects.

3232 ESTIMATIONS OF LOBAR HEPATIC BLOOD FLOWS AND EXTRACTIONS IN SEVERE LIVER CIRRHOSIS. *(E.)* Strandell, T.; Erwald, R.; Lundbergh, P.; Wiechel, K. L. (St. Erik's Hosp., Stockholm, Sweden). *Acta Med. Scand.* 194(3):219-220, 1973.

A technique for the determination of the various hepatic blood flows in patients with advanced liver cirrhosis is presented. The material comprised 1 female alcoholic with severe liver cirrhosis, ascites, and moderate jaundice. A large outer catheter was inserted in the umbilical vein to the distal end of the left portal branch. Within this outer catheter a 2.0/2.5 mm wide teflon one was located into the splenic vein. A 1.05/1.40 mm wide fluor-ethylene-propylene spray catheter with occluded end and 4 side holes was also positioned there. The teflon catheter was removed and beside the infusion catheter a 1.0/1.3 mm wide teflon one was introduced. Additional catheters were precutaneously inserted into a peripheral artery, a peripheral vein and a right hepatic vein. Through the spray catheter 0.2-0.5 mC ^{133}Xe in 100 ml physiological saline was repeatedly infused, first into the splenic vein at a rate of 15 ml/min, later at a rate of 27 ml/min into the middle of the main portal trunk and finally into the first part of the left portal branch. During the infusions, airfree blood samples were drawn in duplicate in 2 ml heparinized plastic syringes from the 2 portal branches, the hepatic veins, and the peripheral artery. The ^{133}Xe activity in the blood samples was measured. The left portal branch contributed 47% of total portal venous flow in the cirrhotic patient compared to 24 and 22%, respectively in the 2 others without signs of liver cirrhosis. In the cirrhotic patient the hepatic artery contribution was 36% in the right lobe, 37 and 34% respectively, in the 2 veins, but 68% in the left lobe. In the other 2 patients, the hepatic artery flows were 41 and 20%, respectively, of total hepatic flow. It is concluded that this method permits a detailed analysis of the complex hepatic circulation in the cirrhotic patient.

3233 SURVIVAL PREDICTION IN PORTACAVAL SHUNTS: A COMPUTERIZED STATISTICAL ANALYSIS. *(E.)* Campbell, D. P.; Parker, D. E.; Anagnostopoulos, C. E. (Univ. Oklahoma Health Sci. Ctr., Oklahoma City). *Am. J. Surg.* 126(6):748-751, 1973.

A computerized statistical analysis of survival prediction in portacaval shunts based on Child's criteria is presented. The material includes 50 patients who underwent end to side portacaval shunts. All patients were assigned to one of Child's groups according to the degree of hepatic functional reserve. Child's criteria measure serum bilirubin, serum albumin, ascites, neurological disorder, and nutrition. Eighteen patients were classified as good risks (Child's A, good hepatic function); 17 patients (38%) were classified as fair risks (Child's B, moderately impaired hepatic function); 10 patients (22%) were classified as poor risks (Child's C, advanced hepatic dysfunction. A decision was reached in 62% of the patients studied, that is, 62% of the patients fell into Child's criteria A or C. Of the 28 subjects for whom a decision was made, 23 were correctly classified and 5 were not. Thus, 59% of the postshunt short-term (18 months or less) and long-term (42 months or more) survivors were correctly identified by the use of Child's criteria. The ability of Child's criteria to correctly identify the long- and short-term survivors was much more accurate for the postnecrotic group than for the nutritional groups. The results confirm that Child's criteria are as good a set of easily obtained predictive parameters as is presently available.

3234 CIRRHOSIS AND HETEROZYGOUS FZ α_1-ANTITRYPSIN DEFICIENCY IN AN ADULT. CASE REPORT AND REVIEW OF THE LITERATURE. *(E.)* Brand, B.; Bezahler, G. H.; Gould, B. (Montefiore Hosp. Med. Ctr., Bronx, N.Y.). *Gastroenterology* 66(2):264-268, 1974.

A case report is presented of a 78-year-old woman without clinical pulmonary disease, and with unsuspected α_1-antitrypsin deficiency who was found to have eosinophilic, periodic acid Schiff-positive, diastase-resistant cytoplasmic inclusions, and cirrhosis, on liver biopsy. Physical examination on admission revealed an elderly woman with obvious orthopnea. Pertinent laboratory data revealed hemoglobin 11.6 g, white blood count 7200; serum glutamic oxaloacetic transaminase 54 mU/ml, alkaline phosphatase 99 mU/ml, cholesterol 133 mg/100 ml, lactic dehydrogenase 225 mU/ml, total bilirubin 0.9 mg/100 ml, protine 12/12, total protein 6.5 g/100 ml, albumin 2.8 g/100 ml. Chest X-ray revealed cardiomegaly and a prominent pulmonary venous pattern without evidence of emphysema or chronic lung disease. Electrocardiogram revealed an old anterior wall myocardial infarction and atrial fibrillation. Liver scan showed hepatosplenomegaly with patchy hepatic uptake. Microscopic sections of the liver biopsy showed fragmentation of the specimen and replacement of the hepatic lobular architecture by micro- and macronodules separated by fibrous septae of varying thickness. Serum protein electrophoresis revealed an α_1-globulin of 2.0% (128 mg/100 ml), α_2-globulin of 12%, β-globulin of 17%, and γ-globulin of 27%. Because of the low α_1-globulin and liver biopsy findings, phenotyping for α_1-AT deficiency was performed. Her phenotype revealed a protease inhibitor Pi^{FZ} pattern and serum trypsin-inhibiting capacity was 0.827 U. It is concluded that a search for α_1-antrypsin deficiency should be carried out in all cases of cryptogenic cirrhosis, regardless of age.

3235 "IDIOPATHIC" PORTAL HYPERTENSION DUE TO OCCLUSION OF INTRAHEPATIC PORTAL VEINS BY ORGANIZED THROMBI: A STUDY BASED ON POSTMORTEM VINYLITE-INJECTION CORROSION AND DISSECTION OF THE INTRAHEPATIC VASCULATURE IN 4 CASES. *(E.)* Boyer, J. L.; Hales, M. R.; Klatskin, G. (Yale Univ. Sch. Med., New Haven, Conn.). *Medicine* 53(1):77-91, 1974.

Four cases of severe portal hypertension with splenomegaly and esophageal varices are presented. The portal hypertension was designated idiopathic in that its cause was not apparent after surgical wedge biopsies of the liver, portography, and measurement of the wedge hepatic vein pressure. However, postmortem investigation of the intrahepatic vasculature by vinylite-injection corrosion in 3 cases and by dissection in 1 case revealed extensive attenuation and occlusion of the intrahepatic portal vein branches by organized thrombi. These observations together with previously reported data suggest that many cases of idiopathic portal hypertension are due to occlusion of the intrahepatic portal vein radicles by organized thrombi, and that currently available diagnostic techniques may fail to detect such vascular lesions during life.

3236 HEPATIC ARTERIALIZATION AND PORTACAVAL SHUNT IN HEPATIC CIRRHOSIS: AN ASSESSMENT. *(E.)* Maillard, J. N.; Rueff, B.; Prandi, D.; Sicot, C. (Hosp. Louis Mourier, Colombes, France). *Arch. Surg.* 108(3):315-320, 1974.

A survey of the results obtained by four teams of workers shows that hepatic arterialization has usually been combined with elective end-to-side portacaval anastomosis (PCA); in some patients, however, it has been done for the relief of encephalopathy months or years after PCA, and in other patients it has been associated with emergency PCA. The total hepatic blood flow after PCA plus arterialization with a small-caliber artery is equal to, or slightly greater than, the preshunt flow. After PCA plus arterialization, the immediate postoperative complications are no worse than after PCA alone, but the subsequent incidence of portosystemic encephalopathy is less. The arteriovenous anastomosis itself is unlikely to be permanent. If it remains patent throughout the first postoperative year, which is the most critical phase of the post-shunt course, it will have served a useful purpose.

3237 EMERGENCY PORTACAVAL SHUNT TREATMENT FOR BLEEDING ESOPHAGEAL VARICES. PROSPECTIVE STUDY IN UNSELECTED PATIENTS WITH ALCOHOLIC CIRRHOSIS. *(E.)* Orloff, M. J.; Chandler, J. G.; Charters, III, A. C.; Condon, J. K.; Grambort, D. E.; Modafferi, T. R.; Levin, S. E. (Sch. Med., Univ. California, San Diego). *Arch. Surg.* 108(3):293-299, 1974.

A prospective evaluation of the emergency portacaval shunt was conducted over a 10-yr period in 115 consecutive cases of alcoholic cirrhosis and bleeding esophageal varices. An extensive diagnostic evaluation was completed within 7 hr of hospital admission and the shunt operation was undertaken within a mean of 8.1 hr. Follow-up was conducted in a special clinic and the current status of 98.3% of the patients is known. Eighty-two percent of the patients had jaundice, ascites, or encephalopathy, alone or in combination, upon admission. Contrary to recent proposals, the patients with the highest portal perfusion pressures and the largest hepatopetal portal blood flows had the highest survival rate, and those who sustained the smallest portal flow diversion from the shunt had the lowest survival rate. The operative survival rate for the 115 cases was 48%, the predicted 7-yr survival rate was 30%, and the actual 7-yr survival rate was 42.5%. There was no difference in survival rates between side-to-side and end-to-side portacaval shunts. In comparison with the results of previous prospective studies, emergency portacaval shunt resulted in a significantly greater long-term survival rate than either emergency medical therapy or emergency varix ligation followed by elective shunt.

3238 EXPERIMENTAL STUDY OF HYPERDYNAMIC VS. STAGNANT MESENTERIC BLOOD FLOW IN PORTAL HYPERTENSION. *(E.)* Witte, C. L.; Witte, M. H.; Bair, G.; Mobley, W. P.; Morton, D. (Univ. Arizona Coll. Med., Tucson). *Ann. Surg.* 179(3):304-310, 1974.

The responses of the mesenteric circulation and the thoracic duct lymph circulation were studied in 18 dogs under conditions which reproduced an exclusively stagnant circulation, a hyperdynamic circulation, or a combination of the two. Although acute portal vein constriction (stagnant circulation) produced marked portal hypertension and an increased thoracic duct lymph flow, this maneuver was associated with a pronounced reduction in the mesenteric arterial flow and mesenteric venous blood oxygen saturation and with a sharp rise in mesenteric vascular resistance and splanchnic oxygen extraction. In contrast, the infusion of glucagon (hyperdynamic circulation) at 0.5 ml/min for 60 min (total dose 30 μg/kg) doubled the mesenteric arterial flow with maintenance of high oxygen saturation of the mesenteric venous blood, low mesenteric vascular resistance, and a modest increase in the thoracic duct lymph flow, which was slightly lowered in protein content. The portal pressure was minimally increased. Slight portal vein constriction combined with the infusion of glucagon produced marked portal hypertension with highly oxygenated mesenteric venous blood and a greatly increased thoracic duct lymph flow low in protein. The mesenteric arterial flow was slightly increased and the mesenteric vascular resistance was slightly lowered. The data indicate that increased portal vascular resistance operates in conjunction with increased splanchnic blood flow to produce the clinical patterns of portal hypertension. "Active congestion" rather than "passive congestion" more accurately characterizes the circulatory derangement in human portal hypertension.

3239 ARSENIC AND NONCIRRHOTIC PORTAL HYPERTENSION. *(E.)* Morris, J. S.; Schmid, M.; Newman, S.; Scheuer, P. J.; Sherlock, S. (Roy. Free Hosp., London, England). *Gastroenterology* 66(1): 86-94, 1974.

Portal hypertension occurred in two patients after 3 and 22 years of treatment with Fowler's solution (arsenic trioxide 1%). One patient had taken about 6 g of arsenic and the other had taken 25-29 g. Other side effects die to arsenic ingestion included skin pigmentation, skin tumors, carcinoma of the larynx, and a probable bronchial carcinoma in one patient, and skin pigmentation and keratoses in the other patient. The level of arsenic in the liver of one patient was markedly high (28 μg/g dry liver). Histological examination of the liver in both patients revealed portal tract fibrosis and an increase in the number of portal veins. In one patient there was slight sclerosis around the portal veins, and in the other the portal veins were greatly thickened and had hypertrophic muscular walls. Repeated histological examination of the liver failed to reveal cirrhosis in either patient. In both patients, the intrasplenic vein pressure was high (17 and 30 mm Hg), indicating that the obstruction to portal flow resided in the portal tracts. It is possible that arsenic is an etiological factor in the production of noncirrhotic portal hypertension in some patients, perhaps because of damage to the intrahepatic portal veins.

3240 CLINICAL IMPORTANCE OF COAGULATION FACTORS TESTS IN HEPATIC CIRRHOSIS. FURTHER DATA TO

THE PROBLEM. *(E.)* Misz, M.; Nagy, P.; Horvath, T.; Dan, S.; Toth, J.; Mikita, J. (Med. Univ., Debrecen, Hungary). *Clinician* 37(10):399-410, 1973.

3241 PLASMA ZINC IN NORMAL SUBJECTS AND IN CASES OF CIRRHOSIS AND IRON DEFICIENCY ANAEMIA. *(E.)* Kumar Lal, A.; Saran, A. (P. W. Med. Coll., Patna, India). *Indian J. Med. Res.* 61(10):1501-1506, 1973.

3242 THOROTRASTOSIS AND HEPATIC CIRRHOSIS. *(Sp.)* Urbano Marquez, A.; Montserrat Costa, E.; Ribas Mundo, M.; Rozman, C. (Fac. Med., Univ. Barcelona, Spain). *Med. Clin.* 60(2):98-101, 1973.

3243 VISCOSITY OF WHOLE BLOOD AND PLASMA IN CIRRHOSIS WITH AND WITHOUT PORTAL HYPERTENSION. *(Ger.)* Leonhardt, H.; Bungert, H. J. (Steglitz Clin., Free Univ., Berlin, Germany). *Wien. Klin. Wochenschr.* 86(1):21-22, 1974.

3244 MONOCLONAL IMMUNOGLOBULINEMIA IN CIRRHOSIS. *(Fr.)* Vesin, P.; Gardies, A.; Naouri, J.; Piet, R.; de Saint-Steban, J.; Viguie, R. (Hosp. Ctr., Argentueil, France). *Arch. Fr. Mal. App. Dig.* 62(8):641-648, 1973.

3245 VARICEAL BLEEDING IN THE DUODENUM IN PORTAL HYPERTENSION. *(Ger.)* Stephan, G. (Radiol. Clin., Univ. Hamburg-Eppendorf, Germany). *Bruns Beitr. Klin. Chir.* 220(5):467-474, 1973.

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See also 2954, 3136.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

3261 BILE ACID EXCRETION AFTER DISAPPEARANCE OF JAUNDICE IN INTRAHEPATIC CHOLESTASIS OF INFANCY. *(E.)* Norman, A.; Strandvik, B. (Karolinska Inst., Stockholm, Sweden). *Acta Paediatr. Scand.* 62(3):264-268, 1973.

In 12 cases of intrahepatic cholestasis of infancy the patients were re-examined 1-58 weeks after disappearance of jaundice. All infants were clinically healthy, but 4 showed raised serum transaminase. Cholic acid-24-^{14}C was injected intramuscularly and the isotope excretion in the urine and feces was investigated for 4 days after the injection. Most of the isotope was excreted in the feces. In 5 of the 12 infants the urine contained 9-26% of the administered isotope whereas the other infants excreted less than 5%. No unconjugated labelled cholic acid was excreted. After solvolysis and hydrolysis the major labelled compound was identified as cholic acid. In 7 healthy infants used as controls no cholic and chenodeoxycholic acids were detected in the urine. All the 12 patients excreted cholic and chenodeoxycholic acids in the urine at the time of the re-examination, the total daily urinary excretion ranging from 0.6 to 3.7 μmol. These results indicated that the bile acid excretion was still impaired after regression of jaundice in the infants who had had intrahepatic cholestasis.

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3293 A CLINICO-PATHOLOGICAL STUDY OF SPONTANEOUS INTERNAL BILIARY FISTULA. *(E.)* Shah, M.; Mori, W. (Tokyo Med. Dental Univ., Japan). *Acta Pathol. Jap.* 23(2):349-358, 1973.

3294 EFFECTS OF COLESTIPOL, A NEW BILE-ACID-SEQUESTERING RESIN, ON CHOLESTEROL METABOLISM UN MAN. *(E.)* Miller, N. E.; Clifton-Bligh, P.; Nestel, P. J. (Dept. Clin. Sci., Australian

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3295 CHLORIDE METABOLISM IN PATIENTS WITH CHOLECYSTITIS AFTER SURGERY. *(Rus.)* Mel'nik, Iu. I. (Kishinev Med. Inst., USSR). *Zdravookhr. Ross. Fed.* (6):25-28, 1973.

3296 CHANGES IN PANCREATIC FUNCTION IN PATIENTS WHO HAVE UNDERGONE CHOLECYSTECTOMY. *(Rus.)* Vorob'ev, L. P. (no affil.). *Kazan. Med. Zh.* (6): 80-81, 1973.

3297 SYSTEMATIZING THE TECHNIQUE FOR TREATING STONES IN THE COMMON BILE DUCT. *(Por.)* Pinotti, H. W. (Fac. Med., Univ. Sao Paulo, Brazil). *Arq. Gastroenterol.* 10(4):279-281, 1973.

3298 LIVER FUNCTION DISORDERS IN CHRONIC BILIARY DISEASE IN CHILDREN AND THE FEASIBILITY OF CORRECTING THEM WITH DRUGS. *(Ukr.)* Tykhyi, A. K.; Archakova, E. V.; Tymchenko, A. V. (Dnepropetrovsk Med. Inst., USSR). *Pediatr. Akush. Ginekol.* 35(5):8-10, 1973.

3299 DISAPPEARING GALLSTONES: REPORT OF 2 CASES. *(E.)* Gray, R. (King's Coll. Hosp., London, England). *Br. J. Surg.* 61(2):101-103, 1974.

3300 BILE PERITONITIS AFTER PERFORATION OF THE GALLBLADDER. *(Ger.)* Voigt, J.; Hantschmann, N. (Surg. Clin., Univ. Kiel, Germany). *Dtsch. Med. Wochenschr.* 99(4):133-137, 1974.

See also 2555, 2754, 2766, 2769, 2798, 2830, 2893, 2947, 2966, 2993, 3158, 3320.

GENERAL

3301 PROTEIN NUTRITION AND LIVER DISEASE AFTER JEJUNOILEAL BYPASS FOR MORBID OBESITY. *(E.)* Moxley, III, R. T.; Pozefsky, T.; Lockwood, D. H. (Johns Hopkins Univ. Sch. Med., Baltimore, Md.). *N. Engl. J. Med.* 290(17):921-926, 1974.

Liver histology and function and protein nutrition were assessed in 9 male and 9 female patients undergoing small-bowel bypass for extreme obesity. Four months after surgery, when weight loss was rapid, SGOT was elevated in 12 patients, and most had marked hepatic steatosis. Of the essential amino acids, plasma valine, isoleucine, leucine, phenylalanine, threonine, and lysine declined, as did the nonessential amino acids alanine, citrulline, cystine, tyrosine, ornithine, and arginine. Glycine and serine were elevated. This profile is typical of protein-calorie malnutrition. Weight stabilization was achieved 12 to 36 months after surgery, at which time transaminase was normal and hepatic fat had diminished. The concentrations of many amino acids returned toward normal, although valine, isleucine, leucine, lysine, tyrosine, ornithine, and arginine remained depressed. Glycine remained elevated. The results of p.o. amino acid tolerance tests indicated that improved absorption accounted for the improved amino acid profiles. Thus, protein malnutrition contributes to hepatic dysfunction, and postoperative amino acid supplementation may be beneficial.

3302 STUDIES ON THE MODE OF ACTION OF CHOLERA TOXIN. EFFECTS ON SOLUBILIZED ADENYLATE CYCLASE. *(E.)* Beckman, B.; Flores, J.; Witkum, P. A.; Sharp, G. W. G. (Massachusetts Gen. Hosp., Boston). *J. Clin. Invest.* 53(4):1202-1205, 1974.

To gain further insight into the mechanism of action of cholera toxin, solubilized preparations of adenylate cyclase from control and toxin-treated livers of female Sprague-Dawley rats were studied. Adenylate cyclase activity was measured in both particulate and solubilized form in rat liver under control conditions and after i.v. injection of cholera toxin. Cholera toxin activated the adenylate cyclase in each animal with an average increase of 3.3-fold over controls in the particulate preparation and caused a 5.8-fold increase in the solubilized preparation. Thus, the ability of cholera toxin to stimulate adenylate cyclase is present even when the enzyme membrane environment is disrupted. Furthermore, the solubilized enzyme, after treatment with cholera toxin, retained its ability to respond to catecholamines, but not to glucagon. In contrast, the control enzyme lost its responsiveness to catecholamines and glucagon after solubilization.

3303 DIARRHEA TOXIN OBTAINED FROM A WATERBLOOM-PRODUCING SPECIES, MICROCYSTIS AERUGINOSA KUTZING. *(E.)* Aziz, K. M. S. (Inst. Public Health, Dacca, Bangladesh). *Science* 183(4130):1206-1207, 1974.

A diarrhea toxin obtained from *Microcystic aeruginosa* laboratory cultures has been isolated and assayed. Microcystis is widely distributed over the world and available to man and animals in many fresh water sources. Initial studies with centrifuged waterbloom consisting predominately of Microcystic aeruginosa obtained from a city pond demonstrated a lethal factor assayed by i.p. injections in rats. Subsequently, a Microcystis clone was established from a single cell cultured from a suspension of disrupted colonies separated by the extinction dilution method. The resulting preparation was assayed in ligated intestinal loops of guinea pigs. Two ml of the nondialyzable fraction of Microcystis toxin produced 0.33

ml of fluid/cm of small intestine of guinea pigs. When 3 ml of the dialyzable portion of the Microcystis whole cell lysate was injected in the loops, no fluid accumulation occurred. However, this dialyzable fraction killed rats when injected i.p. in 0.5 ml volumes. This data suggests a possible cause of diarrhea and diarrheal epidemics where no common source etiology is known and no person to person transmission can be established. It is noted that the use of surface water for drinking purposes where waterbloom is of common occurrence may be a health hazard.

3304 DESIGN AND EVALUATION BY NITROGEN BALANCE AND BLOOD AMINOGRAMS OF AN AMINO ACID MIXTURE FOR TOTAL PARENTERAL NUTRITION OF ADULTS WITH GASTROINTESTINAL DISEASE. *(E.)* Anderson, G. H.; Patel, D. G.; Jeejeebhoy, K. N. (Dept. Nutr., Univ. Toronto, Canada). *J. Clin. Invest.* 53(3):904-912, 1974.

An amino acid mixture was formulated for i.v. use containing 39.4% essential amino acids, with glycine, alanine, arginine, histidine, and proline selected to supply the nonessential nitrogen. Adult patients (2 males and 4 females, aged 24-66 yr) with gastrointestinal disease (including calcific pancreatitis (1), bleeding ulcer with dehiscence of wound and fistula (1), Zollinger-Ellison syndrome with fistula (1), short gut syndrome (1), Crohn's disease with enterocutaneous fistula (1), and post-gastrectomy malnutrition) were fed i.v. for 1 week at each of 3 levels of amino acid intake. All other nutrients were constant. Of these 6 patients, 4 were then fed 1.0 g/kg of egg or meat protein p.o. for 1 wk at the end of the 3 wk study while all other nutrients were fed i.v. Average nitrogen balances of 0.8, 0.5, and 2.2 g/day were observed when the amino acids infused were 0.25, 0.5, and 1.0 g/kg, resp. Fasting levels of threonine, glycine, cystine, methionine, isoleucine, tryptophan, and arginine, but not of the other amino acids, increased with the increment in input, although the levels were generally lower than normal. The increase in blood concentration during infusion was similar for each essential amino acid, indicating the supply of each amino acid was better balanced for utilization than casein hydrolysate. However, blood aminograms did suggest that some changes in composition of the mixture for the malnourished adult were desirable. The amino acid mixture used resembled that needed by the normal growing child. Nitrogen balance in the 4 orally fed patients showed that an amino acid mixture given i.v., provided it is well-balanced, can be utilized as efficiently as oral protein. It is concluded that the prediction of oral requirements for amino acids should be combined with observations on changes in blood aminograms during infusion over a range of amino acid input in the development of amino acid mixtures for i.v. feeding.

3305 COINCIDENT SALMONELLA INFECTIONS AND ULCERATIVE COLITIS: PROBLEMS OF RECOGNITION AND MANAGEMENT. *(E.)* Dronfield, M. W.; Fletcher, J.; Langman, M. J. S. (City Hosp., Nottingham, England). *Br. Med. J.* 1(5898):99-100, 1974.

Five cases of coincident salmonellosis and ulcerative colitis are described. In 3 the diagnostic combination was recognized late, but all cases had features that are difficult to reconcile with simple salmonella dystnery. In case 1 (a 55-yr-old man) the whole large bowel had typical features of ulcerative colitis with severe inflammation, psuedopolyp formation, ragged linear ulceration, and extensive mucosal stripping from the submucosa. Despite reversion to negative stool cultures, diarrhea worsened in case 2 (an 18-yr-old man) and the hemoglobin continued to fall. In case 3 (a 34-yr-old man) anemia was severe, and barium enema showed the typical pattern of chronic ulcerative colitis. A previous history of bloody diarrhea was obtained in case 4 (a 45-yr-old woman), and barium enema showed the characteristic changes of chronic proctosigmoid disease. In case 5 (a 20-yr-old man) the combination of chronic ulcerative colitis and salmonellosis was suggested by profuse bloody diarrhea for 2 weeks prior to admission, pronounced anemia, severe inflammatory change seen at sigmoidoscopy, and an abnormal result on barium enema. If corticosteroid therapy is given for the colitis once the combination is recognized, then simultaneous systemic antibiotic cover with ampicillin is advisable. Case 1 died during corticisteroid therapy alone (prednisolone 40 mg/day) with salmonella septicemia due to usually noninvasive *Salmonella typhimurium.*

3306 EFFECTIVENESS OF LARGE DOSES OF PENICILLIN IN THE TREATMENT OF CARRIERS OF TYPHOID AND PARATYPHOID. *(Rus.)* Kondratenko, G. P.; Kriukova, Z. V.; Mishin, V. V.; Tkach, V. K. (Donetsk Med. Inst., USSR). *Vrach. Delo* (2):133-137, 1974.

3307 MECONIUM PERITONITIS: POSTNEONATAL INTESTINAL DISTENTION. *(E.)* Bayalan, N.; Ramakrishnan, M. S. (Inst. Child Health, Egmore, Madras, India). *J. Pediatr. Surg.* 9(2):243-244, 1974.

3308 THE ISOLATION OF SALMONELLA FROM HUMAN FAECAL SPECIMENS IN SELENITE ENRICHMENT MEDIUM AT INCUBATION TEMPERATURES OF 37 C OR 43 C. *(Ger.)* Aleksic, S.; Tohde, R.; Khan, A. Q. (Hyg. Inst., Hamburg, Germany). *Zentralbl. Bakteriol. [Orig. A]* 225(1):27-33, 1973.

3309 Vi ANTIGEN FROM SALMONELLA TYPHOSA AND IMMUNITY AGAINST TYPHOID FEVER. I. ISOLATION AND IMMUNOLOGIC PROPERTIES IN ANIMALS. *(E.)* Wong, K. H.; Feeley, J. C.; Northrup, R. S.; Forlines, M. E. (Bureau Biologics, FDA, Rockville, Md.). *Infect. Immun.* 9(2):348-353, 1974.

3310 MIXED TUMOR OF THE PAROTID GLAND WITH TYROSINE CRYSTALS. *(Fr.)* Micheau, C. (Gustave-Roussy Inst., Villejuif, France). *Ann. Anat. Pathol.* 18(4):469-476, 1973.

3311 THE RISE AND FALL OF SHIGA DYSENTERY IN EL SALVADOR, 1969-1973. *(E.)* Faich,

G. A.; Rivas, E. N.; Gangarosa, E. J. (Central America Res. Sta., San Salvador, El Salvador). *Bull. Panam. Health Org.* 7(4):20-24, 1973.

3312 BILATERAL CARCINOMA OF THE PAROTID, ONE CANCER ARISING IN A WARTHIN'S TUMOR. *(E.)* Assor, D. (Ohio State Univ. Hosp., Columbus). *Am. J. Clin. Pathol.* 61(2):270-274, 1974.

3313 COMPLICATIONS OF RADIATION THERAPY: THE ALIMENTARY TRACT. *(E.)* Roswit, B. (VA Hosp., Bronx, N.Y.). *Semin. Roentgenol.* 9(1):51-63, 1974.

3314 GASTROINTESTINAL PROBLEMS IN THE OLD. II. *(E.)* Hyams, D. E. (New Cross Hosp., London, England). *Br. Med. J.* 1(5899):150-153, 1974.

3315 CHOLERA AND ITS COUSINS - A PERSPECTIVE. *(E.)* Starkey, D. H. (Queen Mary Vet. Hosp., Montreal, Canada). *Can. J. Public Health* 65(1):9-13, 1974.

3316 SELECTIVE ARTERIAL INFUSION OF VASOCONSTRICTOR MEDICATION IN THE TREATMENT OF GASTROINTESTINAL BLEEDING DUE TO SYSTEMIC LUPUS ERYTHEMATOSUS. *(E.)* Todaro, R. T.; Meensook, C.; Lecchi, R. J.; Demeter, E. (Jamaica Hosp., N.Y.). *Am. J. Gastroenterol.* 60(5):473-477, 1973.

3317 DUODENOGASTRIC REFLUX: ASSOCIATION WITH IRRITABLE BOWEL SYNDROME. *(E.)* Anderson, D. L.; Boyce, Jr., H. W. (Walter Reed Army Med. Ctr., Washington, D.C.). *Gastrointest. Endosc.* 20(3):112-114, 1974.

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GENERAL

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3364 HYDATID CYSTS IN OPERATED LIVERS: STUDY OF 25 CASES. *(Fr.)* Rohner, A.; Mohadjerine, A.; Marti, M. (Surg. Clin., Univ. Geneva, Switzerland). *Helv. Chir. Acta* 41(1/2):151-154, 1974.

See also 2920, 2939, 2962.

GENERAL

Regional Enteritis

3365 RESULTS OF SURGERY FOR INFLAMMATORY BOWEL DISEASE: A FURTHER SURVEY OF ONE HOSPITAL REGION. *(E.)* Ritchie, J. K. (St. Mark's Hosp., London, England). *Br. Med. J.* 1(5902):264-268, 1974.

Case records have been studied for the results of surgery in 294 patients operated on for inflammatory bowel disease during 1967-72 at 34 nonteaching hospitals within the Northeast Metropolitan Hospital

Region. All patients treated surgically for acute colitis and those treated for chronic disease by total colectomy were included. The postoperative mortality of the primary surgery was 23.7%. The mortality was 2.1% in patients treated by elective operation, 37.6% in patients coming to urgent operation and 60.9% in patients treated by emergency operation. The three most important factors affecting the mortality were considered to be: increasing age of the patient, the presence of established colonic dilatation, and preoperative perforation of the colon.

3366 INTRAVENOUS HYPERALIMENTATION: IN THE TREATMENT OF INFLAMMATORY DISEASES OF THE BOWEL. *(E.)* Vogel, C. M.; Corwin, T. R.; Baue, A. E. (Jewish Hosp. St. Louis, Mo.). *Arch. Surg.* 108 (4):460-467, 1974.

Fifteen patients with regional enteritis (14) or ulcerative colitis (1): who were refractory to medical management were treated by bowel rest and i.v. hyperalimentation. Nine received i.v. hyperalimentation as primary therapy and all had remissions. Four have done well for 4 months to 3 yr. Four had recurrences and 1 died later. Six patients received i.v. hyperalimentation before planned operations for localized disease. Five had no recurrences for 6 months to 3 yr and 1 did not tolerate i.v. hyperalimentation. The role of i.v. hyperalimentation for inflammatory bowel disease can be both in preparation for operation and as primary therapy for acute episodes. I.v. hyperalimentation is reserved as primary therapy for patients with previous resections or extensive disease. It has provided prolonged remissions in some and prevented further operations in most. However, the long-term course of the disease was not altered.

3367 DIVERTING ILEOSTOMY FOR COLONIC CROHN'S DISEASE. PART I: SIGNIFICANCE OF ULCERS 5 MM IN DEPTH OR DEEPER ON THE PREOPERATIVE BARIUM ENEMA. *(E.)* Friedland, G. W.; Kohatsu, S.; Oberhelman, Jr., H. A. (Stanford Med. Ctr., Calif.). *Clin. Radiol.* 24(4):427-434, 1973.

In 21 patients with colonic Crohn's disease who had failed to respond to medical treatment, a diverting ileostomy resulted in persistent relief of symptoms in 60% of the cases. Preoperative radiographs for 10 patients (5 males and 5 females, aged 12-45 yr) who experienced persistent remission were reviewed together with radiographs for 5 patients (4 males and 1 female, aged 14-37 yr) in whom ileostomy had failed. Significantly, 80% of the failure patients' colons had raspberry thorn ulcers 5 mm or greater in depth compared with only 20% of the persistent remission group. Similarly, 80% of failure patients' colons had rose thorn or spike-like ulcers 5 mm or greater in depth compared with 30 and 40% resp., of the persistent remission group. Furthermore, 80% of colons in the failure group possessed all types of deep ulcerations, while only 30% of the persistent remission group were so affected. Ulcers 5 mm or greater in depth destroy the colonic muscularis propria and, if numerous, probably result in irreversible changes. If studies on larger numbers of patients confirm this finding, diverting ileostomy would be indicated before numerous deep ulcers develop. The following radiographic features did not appear to influence prognosis: haustral abnormalities, luminal abnormalities, colonic length and abscesses, distribution of the disease, nodules, and fistulas.

3368 DIVERTING ILEOSTOMY FOR COLONIC CROHN'S DISEASE. PART 2: RADIOLOGICAL FINDINGS IN THE COLON FOLLOWING DIVERSION. *(E.)* Friedland, G. W.; Kohatsu, S.; Oberhelman, Jr., H. A. (Stanford Med. Ctr., Calif.). *Clin. Radiol.* 24(4):435-439, 1973.

The radiological and clinical features preceeding and following diverting ileostomy for Crohn's disease were evaluated in 15 patients (9 males and 6 females, aged 12-58 yr). In the majority of patients who showed clinical improvement, ulcers and nodules gradually disappeared although their disappearance tended to lag behind clinical improvement. Radiological features which occurred only in patients showing clinical and radiological improvement were increases in length and width of the colon and reappearance of colonic haustra. Nonspecific radiological features which occurred both in patients who had an asymptomatic radiological relapse and in patients requiring colectomy for clinical and radiological relapse were severe narrowing and shortening of the colon, or reappearance of ulcers and nodules. Asymptomatic radiological relapse occurred in 7 cases. Such relapses generally consisted of reappearance or worsening of ulcers and nodules, and, in 1 patient, moderately severe narrowing of the lumen. Radiological follow-up is therefore essential. Intestinal continuity should not be reestablished if a radiological relapse is evident.

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3371 CROHN'S DISEASE WITH AMYLOIDOSIS. REPORT OF TWO CASES AND REVIEW OF THE LITERATURE. *(Fr.)* Messing, B.; Rambaud, J. C.; Bitoun, A.; Sraer, J. D.; Goas, J. Y.; Tcherdakoff, P.; Bernier, J. J. (St. Lazare Hosp., Paris, France). *Arch. Fr. Mal. App. Dig.* 62(8):663-671, 1973.

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See also 2942, 3109.

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NATIONAL INSTITUTE OF ARTHRITIS, METABOLISM, AND DIGESTIVE DISEASES

U.S. DEPARTMENT OF
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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

GASTROENTEROLOGY ABSTRACTS and CITATIONS is published monthly and includes citations and abstracts from the biomedical world literature as they are currently received. In addition, yearly cumulated subject and author indexes are published.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1975.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *World Medical Periodicals*, 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	It.	Italian
Ar.	Arabic	Jap.	Japanese
Bul.	Bulgarian	Kor.	Korean
Ch.	Chinese	Latv.	Latvian
Cz.	Czech	Lith.	Lithuanian
Dan.	Danish	Nor.	Norwegian
Dut.	Dutch	Pol.	Polish
E.	English	Por.	Portuguese
Eston.	Estonian	Rum.	Rumanian
Fin.	Finnish	Rus.	Russian
Fl.	Flemish	Ser.	Serbo-Croatian
Fr.	French	Sl.	Slovak
Ger.	German	Sp.	Spanish
Gr.	Greek	Sw.	Swedish
Heb.	Hebrew	Th.	Thai
Hun.	Hungarian	Turk.	Turkish
Ic.	Icelandic	Uk.	Ukrainian
In.	Indonesian	Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	mC,μC	milli-,microcurie(s)
ADP	adenosine diphosphate	mg	milligram(s)
AMP	adenosine monophosphate	min	minute(s)
ATP	adenosine triphosphate	ml	milliliter(s)
BSP	sulfobromophthalein	mm	millimeter(s)
C	degrees centigrade	MTD	maximum tolerated dose
cm	centimeter(s)	ng	nanogram (10^{-9})
CNS	central nervous system	pg	picogram (10^{-12})
cpm	counts per minute	p.o.	orally
DNA	deoxyribonucleic acid	ppm	parts per million
e.g.	for example	r	Roentgen
g	gram(s)	RBC	red blood cells (erythrocytes), red blood count
μg	microgram(s)	resp.	respectively
hr	hour(s)	Rev.	review (only in citations)
i.m.	intramuscular	RNA	ribonucleic acid
i.p.	intraperitoneal	s.c.	subcutaneous
IU	international unit(s)	sec	second(s)
i.v.	intravenous	SGOT	serum glutamic-oxalacetic transaminase
kg	kilogram(s)	SGPT	serum glutamic-pyruvic transaminase
LD_{50}	median lethal dose(s)	U	unit(s)
LDH	lactic acid dehydrogenase	UV	ultraviolet
m	meter(s)	WBC	white blood cells (leukocytes), white blood count
M	molar	yr	year(s)
mEq	milliequivalent(s)		
mM	millimolar		
μM	micromolar		

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

'3 INFLUENCE OF ADRENALECTOMY AND β-METHASONE
ON THE COMPOSITION OF LIVER CELL MEMBRANE.
) Elert, O.; Staib, W. (Dept. Physiol. Chem.,
v. Dusseldorf, Germany). *Steroids Lipids Res.*
):65-75, 1973.

sma membranes were isolated from female Brünger
liver by centrifugation through a discontinuous
rose density gradient. The membranes were con-
inated by 6.7% microsomes and 3.3% mitochondria,
there was no DNA present. Examination under the
ctron microscope showed the preparation to be free
ribosomes, nuclei and bile canaliculi. The total
tein, cholesterol and carbohydrate composition
the membranes was measured, and the proteins
e further separated by acrylamide gel electrophor-
s. One week after adrenalectomy, the protein,
bohydrate and cholesterol contents of the liver
branes were significantly less than in membranes
m intact rats. Administration of β-methasone
1 or 4 hr caused the measured parameters to re-
n to values near to those found in intact animals.
may be assumed that 7 days after adrenalectomy,
influence on the intermediate metabolism has
en place and fewer plasma membranes are obtained.
t adrenalectomy a severe change in the interac-
n of protein and lipid layer of the membranes
occur with the result that the stabilizing effect
l be impaired, in particular if the membranes
ve their physiological surroundings. It is feas-
e that the binding capacity which stabilizes the
branes directly or indirectly has become affected
t adrenalectomy. To exclude a possible correla-
n between the effect of adrenal steroids on en-
e induction and the transport of amino acids,
ther studies on the effect of actinomycin D would
in the solution of this problem.

'4 ENDOCRINE CELLS IN THE HUMAN DUODENAL MU-
COSA: AN ULTRASTRUCTURAL STUDY. *(Fr.)*
xinos, J.; Balas, D.; Ribet, A. (Purpan Hosp.,
louse, France). *Biol. Gastroenterol. (Paris)*
):105-117, 1973.

er fixation with glutaraldehyde and osmium tetrox-
, electron microscope examinations were made of
duodenal specimens obtained by biopsy or at sur-
y from 6 subjects with no evidence of gastro-
estinal disease and 7 patients with ulcers, stom-
cancer, or chronic pancreatitis. At least 6
ferent types of endocrine cells were found.
se included L, S, I, D, EC (types 1 and 2), and
-like" cells. The endocrine cell density was high-
in the first and second third of the duodenum
decreased somewhat in the lower third. Although
re were large variations from one subject to
ther, endocrine cells accounted for about 5% of
cell population in the first two-thirds of the
denum and 1-2% in the lower third. The I cell,
ch is morphologically intermediate between L and
ells, probably does not represent a different
ge in maturation or secretion of the L and S cells
ce all 3 types were found in nonstimulated duo-
al mucosa.

3375 EFFECTS OF PROTEIN-CALORIE MALNUTRITION ON THE JEJUNAL MUCOSA OF TETRACYCLINE-TREATED PIGS. *(E.)* Neutra, M. R.; Maner, J. H.; Mayoral, L. G. (Harvard Med. Sch., Boston, Mass.). *Am. J. Clin. Nutr.* 27(2):287-295, 1974.

The effect of moderate protein-calorie depletion and subsequent repletion was studied in 40 pigs, and the morphological effects of simultaneously modifying the bacterial flora by chlortetracycline were determined when placed on a low protein diet (9.85 g/100 g of diet) for 14 weeks, all pigs had drastically reduced food intake and appeared stunted but not edematous. Pigs that continued on this diet for an additional six weeks remained anorexic and stunted, and 2 died. In contrast, pigs that were changed to a high protein diet (18.00 g/100 g of diet) at the end of the 14-week depletion period quickly increased their food consumption and grew rapidly; by the end of 20 weeks they had at least doubled their weight. In pigs on the low protein diet for 14 or 20 weeks, the jejunal mucosa were thin and both villi and crypts were shortened, although structurally normal. Pigs given the high protein diet for 6 weeks after the depletion period showed a highly significant increase in mucosal thickness, due to growth of both crypts and villi. Histologic comparison of jejunal mucosa from malnourished and repleted pigs revealed no consistent differences in villus width or in numbers of lymphocytes in the lamina propria. Connective tissue elements were proportionally reduced in the thin malnourished mucosas, and columnar absorptive cells were significantly shorter than in repleted pigs. Pigs which received chlortetracycline (0.03 g/100 g of food) tended to have slightly lower body weights and thinner jejunal mucosa than those not given antibiotic; this trend was present both in the malnourished and repleted dogs. The slight deleterious effect of chlortetracycline was probably due to direct inhibition of protein synthesis in epithelial cells, which in turn inhibited amino acid transport.

3376 COMPARATIVE STUDY OF BLOOD VESSELS IN THE HEPATIC PORTAL AND ITS VICINITY WITH SPECIAL CONSIDERATION OF THE GUINEA PIG. *(Ger.)* Von Haller, C.; Lade, R. (Animal Res. Lab., Univ. Frankfurt/Main, Germany). *Anat. Anz.* 135(1/2): 102-115, 1974.

3377 NECROSIS AND HYPERBASOPHILIA IN THE HEPATIC PARENCHYMA OF THE RAT. *(Fr.)* Thompson, J. P.; Moulin-Camus, M. C.; Daoust, R. (Cancer Inst., Montreal, Canada). *Rev. Can. Biol.* 33(1): 45-54, 1974.

3378 DEGENERATION ANALYSIS OF THE EXTRINSIC NERVE ELEMENTS OF THE SMALL INTESTINE. *(E.)* Feher, E.; Vajda, J. (Semmelweis Univ. Med. Sch., Budapest, Hungary). *Acta Anat.* 87(1):97-109, 1974.

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

3379 ANNULATE LAMELLAE IN HEPATIC AND PANCREATIC BETA CELLS OF THE CHICK EMBRYO (1). *(E.)* Benzo, C. A. (Dept. Anat., State Univ. New York, Syracuse). *Am. J. Anat.* 140(1):139-143, 1974.

3380 ORGAN CULTURE OF ADULT GUINEA-PIG INTESTINE. I. ULTRASTRUCTURAL ASPECT AFTER 24 AND 48 HOURS OF CULTURE. *(E.)* Kedinger, M.; Haffen, K.; Hugon, J. S. (Med. Ctr., Univ. Sherbrooke, Canada). *Z. Zellforsch.* 147(2):169-181, 1974.

3381 FINE STRUCTURE OF LANGERHANS CELLS IN THE STRATIFIED EPITHELIA OF THE ESOPHAGUS AND STOMACH OF MICE. *(E.)* Bock, P. (Dept. Micromorphol., Electron Microscopy, Univ. Vienna, Austria). *Z. Zellforsch.* 147(2):237-247, 1974.

3382 ELECTRON MICROSCOPE STUDIES ON THE INTESTINE USING RUTHENIUM RED. *(E.)* Gebbers, J. O.; Otto, H. F. (Inst. Pathol., Univ. Hamburg, Germany). *Z. Zellforsch.* 147(2):271-283, 1974.

3383 FUNCTIONAL STRUCTURE OF THE RAT LIVER. INFLUENCE OF DIFFERENT TYPES OF PREPARATION. *(E.)* Faarup, P.; Jorgensen, M.; Holm-Nielsen, A. (Bispebjerg Hosp., Copenhagen, Denmark). *Acta Pathol. Microbiol. Scand.* [*A*] 82(1):7-12, 1974.

3384 FUNCTIONAL STRUCTURE OF THE CIRRHOTIC RAT LIVER. *(E.)* Jorgensen, M.; Norgaard, T.; Faarup, P. (Univ. Inst. Pathol. Anat., Copenhagen, Denmark). *Acta Pathol. Microbiol. Scand.* [*A*] 82(1):13-20, 1974.

3385 EFFECTS OF CAPSAICIN IN COMBINATION WITH DIETS OF VARYING PROTEIN CONTENT ON THE DUODENAL ABSORPTIVE CELLS OF THE RAT. *(E.)* Nopanitaya, W. (Sch. Med., Univ. North Carolina, Chapel Hill). *Am. J. Dig. Dis.* 19(5):439-448, 1974.

3386 FUNCTIONAL AND MORPHOLOGICAL CHARACTERISTICS OF AGE-RELATED CHANGES OF FIBROUS STRUCTURES OF THE GASTRIC CONNECTIVE TISSUE. *(Rus.)* Razin, S. N. (Vinnitsa Med. Inst., USSR). *Vrach. Delo* (3):86-90, 1974.

3387 CHANGES IN THE NUCLEUS AND IN MITOSIS IN AGING LIVER. *(Ger.)* Klinge, O. (Pathol. Inst., Univ. Wurzburg, Germany). *Gerontologia* 19(5/6):314-329, 1973.

3388 ELECTRON-MICROSCOPIC INVESTIGATION OF THE LIVER WITH ARRESTED HEPATO-INTESTINAL CIRCULATION OF BILE. *(Rus.)* Bezprozvannyi, B. K.; Vasilieva, E. N.; Saliev, F. Sh.; Doronin, P. P. (Inst. Nutr., Moscow, USSR). *Vopr. Pitan.* (1): 27-31, 1974.

3389 SMOOTH MUSCLE CELL REGENERATION IN REPAIR OF GASTRIC ANASTOMOSIS IN THE DOG. *(E.)* Jurukova, Z.; Atanassova, E. (Acad. Med., Sofia, Bulgaria). *Res. Exp. Med.* 162(4):299-312, 1974.

3390 LONG-TERM CULTURE OF HUMAN ADULT LIVER CELLS: MORPHOLOGICAL CHANGES RELATED TO IN VITRO SENESCENCE AND EFFECT OF DONOR'S AGE ON GROWTH POTENTIAL. *(E.)* Le Guilly, Y.; Simon, M.; Lenoir, P.; Bourel, M. (Pontchaillou Hosp., Rennes, France). *Gerontologia* 19(5/6):303-313, 1973.

See also, 3547, 3549, 3551, 3591, 3599, 3606.

ABSORPTION—EXCRETION—TRANSPORT

3391 QUANTITATIVE DIGESTION OF FRESH HERBAGE BY SHEEP. I. THE SITES OF DIGESTION OF ORGANIC MATTER, ENERGY, READILY FERMENTABLE CARBOHYDRATE, STRUCTURAL CARBOHYDRATE, AND LIPID. *(E.)* Ulyatt, M. J.; MacRae, J. C. (Applied Biochem. Div., Dept. Sci. Ind. Res., Palmerston North, New Zealand). *J. Agric. Sci. Camb.* 82(2):295-307, 1974.

Sheep prepared with a rumen cannula or a rumen cannula plus re-entrant cannulae in the duodenum and ileum were fed fresh 'Raunnui' perennial ryegrass (R), 'Manawa' short-rotation ryegrass (M), and white clover (C) at dry matter intakes ranging from 450 to 1000 g/24 hr. The re-entrant cannulated sheep were given paper impregnated with chromic oxide (Cr_2O_3) once daily *via* the rumen fistula as a marker; recoveries of Cr_2O_3 at the duodenum, ileum, and feces were approximately 75, 69, and 100%, resp. There were differences between pasture species in partition of organic matter (OM) and energy digestion. With M, digestion in the stomach was significantly less and digestion in the small intestine was significantly more than with either R or C. These partitions of OM and energy digestion changed with the level of feed intake. A substantial proportion of the digestible OM and energy was apparently digested in the large intestine with all three herbages. Approximately 93% of the digestible readily fermentable carbohydrate and 90% of the digestible structural carbohydrate was digested in the stomach region with all three herbages. Although the data do not provide an unequivocal explanation for the superiority of C over the ryegrasses in efficiency of utilization, it appears that differences between the egrasses in rate of breakdown in the rumen are ermined primarily by the rate at which the micro-ganisms can hydrolyse the plant structural carbo-drates.

92 INTESTINAL ABSORPTION OF D-XYLOSE AND FOLIC ACID IN PROTEIN-DEFICIENT PATAS

NKEYS (ERYTHROCEBUS PATAS). *(E.)* Gyr, K.; Wolf, H.; Felsenfeld, O. (Tulane Univ., Delta Primate Res. r., Covington, La.). *Am. J. Clin. Nutr.* :350-354, 1974.

testinal absorption of D-xylose and folic acid s studied before and during moderate protein de-ciency (serum albumin of 3 g/100 ml or less) by a rfusion technique in 8 patas monkeys (*Erythrocebus tas*). In 4 animals the study was repeated during covery from protein depletion. A mean of 15.8% ylose was absorbed during the base-line study mpared with 14.2% during protein depletion. Respec-ve values of folic acid absorption were 22.2 and .4%. The folic acid absorption returned to the se-line level during recovery. The drop in folic id absorption during protein deficiency was signi-cant. No corresponding histological changes of e intestinal mucosa were noted during the time of servation. The discrepancy between D-xylose and lic acid absorption may reflect different mechanisms absorption, folic acid depending much more on ac-ve transport. The process of active transport is st likely depressed by protein deficiency before ssive mechanisms, like diffusion, are affected.

93 THE EFFECTS OF INTESTINAL VASODILATOR MECHANISMS ON THE RATE OF ^{85}Kr ABSORPTION

THE CAT. *(E.)* Biber, B. (Dept. Physiol., Univ. teberg, Sweden). *Acta Physiol. Scand.* 90(3):578-2, 1974.

e absorption of ^{85}Kr from the small intestine of e cat was estimated during intestinal vasodilata-on induced by transmural electrical field stimula-on or by local intraarterial infusions (2.5-10.5 g/hr) of cholecystokinin or secretin. As blood ow increased, the rate of absorption was consider-ly augmented. Moreover, both electrical field imulation and hormonal infusion increased the rate ^{85}Kr absorption in excess of that seen during opropylnoradrenaline vasodilatation. An increased action of the intramural blood flow became fully uilibriated with luminal contents during the vaso-latory procedures, particularly during secretin ministration. The results suggest that a local crease and redistribution of blood flow, favoring e superficial mucosal layers, occurs postprandially the small intestine.

94 INHIBITORY EFFECT OF HIGH DIETARY ZINC ON COPPER ABSORPTION IN RATS.

(E.) Ogiso, ; Moriyama, K.; Sasaki, S.; Ishimura, Y.; Minato, (Fac. Pharm. Sci., Chiba Univ., Japan). *Chem. arm. Bull.* 22(1):55-60, 1974.

le Wistar rats fed a 1% zinc diet for 15 days owed significant decreases in body weight gain, ceruloplasmin activity, hemoglobin concentration, and copper content of liver, kidney, and serum. Zinc concentrations in liver, kidney, and serum increased markedly, suggesting that the decreases in copper content were a consequence of zinc accumulation. Copper uptake in liver of zinc-fed rats was reduced by administration of copper (4 mg/100 g), the reduction being higher for p.o. (82.7%) than for i.p. (42.3%) administration. Moreover, copper uptake in liver was depressed when copper and zinc were administered simultaneously to normal rats by the p.o. route. Short-term experiments with ^{64}Cu showed that zinc interferes with the absorption and utilization of copper: blood radioactivity of rats fed the 1% zinc diet for 9 days was much lower than in untreated controls. Biliary excretion of copper was less than 4.0 μg/100 ml in rats fed the high-zinc diet for 3 or 6 days, compared with 40.3 μg/100 ml in normal controls. These results indicate that disturbance of copper metabolism by zinc feeding is mainly due to the inhibition of copper absorption at the intestinal level.

3395 QUANTITATIVE DIGESTION OF FRESH HERBAGE BY SHEEP. II. THE SITES OF DIGESTION OF SOME NITROGENOUS CONSTITUENTS.

(E.) MacRae, J. C.; Ulyatt, M. J. (Applied Biochem. Div., D.S.I.R., Palmerston North, New Zealand). *J. Agric. Sci. Camb.* 82(2):309-319, 1974.

Sheep prepared with a rumen cannula or a rumen cannula plus re-entrant cannulae in the duodenum and ileum were fed fresh "Raunnui" perennial ryegrass (R), "Manawa" short-rotation ryegrass (M), and white clover (C) at dry matter intakes ranging from 450-1000 g/24 hr. At an intake of 500 g, the amounts of nonammonia-nitrogen (NAN) entering the small intestine were significantly greater in sheep given M than in sheep given R or C. At an intake of 800 g, the amounts in sheep given M were significantly greater than in sheep given R. NAN leaving the small intestine and nitrogen excreted in the feces were similar for all three diets. At an intake of 800 g, the apparent absorption of NAN from the small intestine of sheep given M and C was significantly greater than that of the sheep given R. As the intake of herbage was increased, the partition of digestion altered. Only small differences between herbages were found in the amino acid composition of the duodenal and ileal digesta, but because of the large differences in the flow of NAN, the apparent absorption of individual amino acids from the small intestine was much higher in sheep given M than in sheep given R or C.

3396 QUANTITATIVE DIGESTION OF FRESH HERBAGE BY SHEEP. III. THE MOVEMENT OF Mg, Ca, P, K AND Na IN THE DIGESTIVE TRACT.

(E.) Grace, N. D.; Ulyatt, M. J.; MacRae, J. C. (Applied Biochem. Div., D.S.I.R., Palmerston North, New Zealand). *J. Agric. Sci. Camb.* 82(2):321-330, 1974.

Sheep prepared with a rumen cannula or a rumen cannula plus re-entrant cannulae in the duodenum and ileum were fed fresh 'Ruannui' perennial ryegrass (R), 'Manawa' short-rotation ryegrass (M), and white clover (C) at dry matter intakes ranging from 450-1000 g/24 hr. Paper impregnated with chromic oxide was given once daily *via* the rumen fistula as a marker. The quantities of Mg (at high intake), Ca, and K (except in sheep fed M) leaving the stomach were significantly lower than the amounts consumed, while the amounts of P and Na leaving the stomach were significantly higher. The quantities of Mg (at high intakes) and Ca leaving the small intestine were significantly higher than the corresponding quantities entering the small intestine, while the amounts of P, K, and Na leaving the small intestine (at high intakes) were significantly lower. The amounts of Na (at high and low intakes) and the other mineral elements (at high intakes) excreted in the feces were significantly less than the amounts entering the large intestine. Thus, at higher intakes there were net absorptions of Mg, Ca, and K (except in sheep fed M) from, and net secretions of P and Na into, the stomach. The small intestine was the major site of net absorption for P and K and a minor site for Na, while a net secretion of Mg and Ca occurred into this region. The net absorption of Mg, Ca, P, K, and Na occurred from the large intestine at the higher intakes.

3397 THE INTESTINAL ABSORPTION OF DYPHENYLHYDANTOIN FROM A SUSPENSION IN RATS. *(E.)*

Van Rees, H.; Noach, E. L. (Dept. Pharmacol., Univ. Leiden, Netherlands). *Arch. Int. Pharmacodyn. Ther.* 206(1):76-83, 1973.

The duodenum, jejunum plus ileum, or colon was isolated in male albino rats using ligatures on both ends. Diphenylhydantoin (DPH, 3 or 6 mg) was then administered intraluminally into the isolated gut sections as a suspension in a 10% gum arabic solution. The DPH content of the small intestine decreased linearly with time during the first 6 hr after administration, after which the rate of decrease diminished. The results were independent of dose and site of administration. The decrease in the DPH content of the colon was nonlinear. The decrease in the total gut content of DPH appeared to be a first order process. The results indicated that the rate-limiting factor in the intestinal absorption of DPH was the dissolution process from the suspension.

3398 INTESTINAL TRANSPORT OF CARBOHYDRATES AS MEASURED BY PORTAL CATHETERIZATION IN MAN. *(E.)*

Dencker, H.; Meeuwisse, G.; Norryd, C.; Olin, T.; Tranberg, K.-G. (Dept. Surg., Pediatrics, Roentgen Diagnostics, Univ. Lund, Sweden). *Digestion* 9(6):514-524, 1973.

A method for studying the transport of an intraduodenally instilled solution of carbohydrates by simultaneous sampling of portal and arterial blood is described. The transport of glucose, maltose and fructose was measured in ambulant adult patients with cancer of the colon without liver metastases. They were in a normal nutritional state; 200 ml of a 6% carbohydrate solution was instilled intraduodenally within 10 minutes. Portal glucose rise was not slower after instillation of maltose than after that of glucose. Transport of fructose was completed somewhat later than that of glucose. The difference in the portal-arterial blood sugar concentration was used as a measure of the actual net influx of carbohydrates into the portal circulation at certain intervals. After instillation of glucose or maltose the portal-arterial glucose difference showed 2 maxima. The interposed minimum often reached a slightly negative value. It is tentatively assumed that this unexpected finding was due to accumulation of glucose in the intestinal mucosa, followed by a release of the accumulated glucose coinciding with the subsequent fall of arterial blood glucose concentration. Absorbed fructose did not behave in the same manner. Although some transformation of fructose to glucose during transport through the intestinal wall may have occurred, it was less than could be detected in these experiments.

3399 THE FATTY ACID COMPOSITION OF THE MAIN PHOSPHOLIPID FRACTIONS OF THE RUMEN AND ABOMASUM TISSUES OF FOETAL AND ADULT SHEEP. *(E.)*

Body, D. R.; Shorland, F. B. (Applied Biochem. Div., D.S.I.R., Palmerston N., New Zealand). *J. Sci. Food Agric.* 25(2):197-204, 1974.

The fatty acid composition of the phosphatidyl choline, phosphatidyl ethanolamine, and sphingomyelin fractions of the rumen and abomasum tissues of fetal and adult Romney sheep was determined. The major proportion of the polyunsaturated fatty acids was in the phosphatidyl ethanolamine fraction, being reduced in the other two fractions. The phosphatidyl ethanolamine fractions were further characterized by a comparatively low palmitic acid content and the presence of cyclopropane fatty acids. The sphingomylein fractions contained relatively large amounts of higher n-saturated fatty acids, the total amounts of acids above C_{20} tending to vary inversely with the levels of palmitic acid; the levels of stearic acid remained relatively constant. Although the fatty acid composition did vary markedly with age, the fetal tissues, in contrast to the adult tissues, contained substantial amounts of eicos 5,8,11-trienoic acid and relatively small amounts of linolenic and linoleic acids and acids of the $\omega 3$ series. The results are consistent with a requirement for C_{20} and C_{22} polyunsaturated acids of the $\omega 3$ and $\omega 9$ series and some penetration of maternal fatty acids through the placenta. The resemblance between the fatty acid make-up and the composition of the fetal and maternal phospholipids suggests the possibility of transference of intact or lysophospholipids from the mother to the fetus via the placenta.

3400 INTESTINAL ABSORPTION OF VITAMIN B_6. I. PYRIDOXOL UPTAKE BY RAT INTESTINAL TISSUE. *(E.)*

Tsuji, T.; Yamada, R.; Nose, Y. (Kyoto Prefectural Univ. Med., Kyoto, Japan). *J. Nutr. Sci. Vitaminol.* 19(5):401-417, 1973.

Small ring segments from the small intestine of male Wistar rats were incubated with ^{3}H-pyridoxal. Subsequent accumulation studies indicated that the content of compounds increased in intestinal

ssue when it was incubated with dilute solutions of
ridoxol. This accumulation occured primarily *via*
e metabolic conversion of pyridoxol to B_6 phospates.
e mechanism of pyridoxol uptake consisted of two
eps: entrance into the tissue, and metabolic
nversion in the intracellular space. Pyridoxol
parently enters the intracellular fluid space by
mple diffusion, although there is a less likely
ssibility that 2 distinct mechanisms are involved
the uptake process.

01 INOSITOL DEFICIENCY IN GERBILS: DIETARY
EFFECTS ON THE INTESTINAL LIPODYSTROPHY.
) Kroes, J. F.; Hegsted, D. M.; Hayes, K. C.
rvard Sch. Public Health, Boston, Mass.). *J.*
r. 103(10):1448-1453, 1973.

e effects of coconut oil, partially purified tri-
cerides, and dietary cholesterol on the induction
the intestinal lipodystrophy were investigated in
ale gerbils fed diets low in inositol. When the
ositol-deficient diet was fed with saturated tri-
cerides, maximal gut lipid was found with trigly-
rides rich in lauric acid (12:0) and somewhat less
th those rich in capric acid (10:0) and myristic
id (14:0), these being the major fatty acids in
conut oil. Increasing chain length decreased the
cumulation of gut lipid. No excess was found with
iglycerides rich in caprylic acid (8:0), presum-
ly absorbed through the portal system, or with
earic acid (18:0). The latter, however, was poorly
sorbed. Unsaturated triglycerides rich in oleic
linoleic acids (18:1 ω 9 and 18:2 ω 6) also pro-
ced no accumulation of gut lipid. Feeding 0.2 to
5% of cholesterol accentuated the lipodystrophy,
t this was prevented by inositol. The resistance
male gerbils to the lipodystrophy was eliminated
castration, indicating that testicular synthesis
inositol was a major factor in the difference be-
een male and female gerbils. It appears that the
eding of large amounts of certain fats to gerbils
creases the inositol requirement for the formation
lipoproteins or their transport from the mucosal
lls. This implies that the gerbil either has a
ique inositol-dependent mechanism for the synthe-
s and transport of intestinal lipoproteins, or that
is species differs in its ability to synthesize
fficient endogenous inositol. The latter seems
re probable. Inositol had an effect on the circu-
ting cholesterol concentration that was affected
the type of dietary fat and sex of the gerbil.
e basic response to saturated fat in both males and
males is an elevation in the plasma cholesterol.
en dietary inositol is limiting, the male presum-
ly maintains this rise with endogenous synthesis
the testes, whereas the female cannot meet the
dogenous requirement and her plasma cholesterol
clines as the lipodystrophy develops. It is
ncluded that only in the presence of an adequate
pply of inositol was the effect of dietary fat and
olesterol on circulating cholesterol clearly
own.

02 INCREASE OF ACTIVE TRANSPORT OF CONJUGATED
BILE SALTS IN STREPTOZOTOCIN-DIABETIC RAT
ALL INTESTINE. *(E.)* Caspary, W. F. (Univ. of
ttingen, Germany). *Gut* 14(12):949-955, 1973.

Active transport of conjugated bile salts, Na-tauro- and Na-glycocholate and D-galactose, was examined in the small intestine of streptozotocin-diabetic female Wistar rats by an *in vitro* technique. Tissue uptake and mucosal to serosal transport of conjugated bile salts and D-galactose was enhanced in diabetic rat ileum. The minimal transport capacity for conjugated bile salts in the jejunum did not differ between diabetic and control intestine. D-galactose transport and transport of 3-0-methyl-glucose were, however, enhanced in diabetic jejunum as well. Kinetic analysis of the initial uptake rates for conjugated bile salts revealed that the maximal transport capacity (Vmax) was enhanced in diabetic ileum. In accordance with earlier results on the effect of experimental diabetes mellitus on digestive-absorptive functions it is suggested that experimental diabetes mellitus increases the transport capacity of active, Na^+-dependent intestinal transport processes in general. It is concluded that experiments *in vivo* will be necessary to show whether the observed increase of ileal bile salt reabsorption in experimental diabetes mellitus will have an effect on bile salt pool size or synthesis rate. Under conditions of increased reabsorptive capacity for bile salts in diabetic small intestine, bile salt synthesis by the liver might be expected to be decreased. Although no data are available on bile acid synthesis rates in streptozotocin-diabetes, the increased transport capacity for conjugated bile salts could be an adaptive process of the ileum due to an increased bile acid synthesis rate in the liver. Consequently, the transport capacity for bile salts increases as a result of increased bile salt pool size.

3403 DIMENSIONS OF POLAR PATHWAYS THROUGH RABBIT GALLBLADDER EPITHELIUM. THE EFFECT OF PHLORETIN ON NONELECTROLYTE PERMEABILITY. *(E.)* Van Os, C. H.; De Jong, M. D.; Slegers, J. F. G. (Dept. Physiol., Univ. Nijmegen, Netherlands). *J. Membrane Biol.* 15(4):363-382, 1974.

3404 THEORETICAL MODEL STUDIES OF INTESTINAL DRUG ABSORPTION IV: BILE ACID TRANSPORT AT PREMICELLAR CONCENTRATIONS ACROSS DIFFUSION LAYER - MEMBRANE BARRIER. *(E.)* Ho, N. F. H.; Higuchi, W. I. (Coll. Pharm., Univ. Michigan, Ann Arbor). *J. Pharm. Sci.* 63(5):686-690, 1974.

3405 RESPONSE OF INTESTINAL CALCIUM TRANSPORT AND BONE CALCIUM MOBILIZATION TO 1,25-DIHYDROXYVITAMIN D_3 IN THYROPARATHYROIDECTOMIZED RATS. *(E.)* Garabedian, M.; Tanaka, Y.; Holick, M. F.; Deluca, H. F. (Coll. Agr. Life Sci., Univ. Wisconsin, Madison). *Endocrinology* 94(4):1022-1027, 1974.

3406 ABSORPTION OF RADIOVITAMIN B_{12} IN MICE AFTER SPECIFIC IRRADIATION OF THE STOMACH. *(E.)* Salmi, H. A.; Salmi, T. T.; Lindgren, I. (Dept. Physiol., Univ. Turku, Finland). *Ann. Med. Exp. Biol. Fenn.* 51(4):151-154, 1973.

3407 EFFECT OF SODIUM SULPHATE AND CASTOR OIL ON DRUG ABSORPTION FROM THE HUMAN INTESTINE. *(E.)* Mattila, M. J.; Takki, S.; Jussila, J.

(Dept. Pharmacol., Univ. Helsinki, Finland). *Ann. Clin. Res.* 6(1):19-24, 1974.

3408 ELECTROLYTE TRANSPORT ACROSS THE MOUSE SMALL INTESTINE. *(E.)* Chang, L. R.; Chen, T. S. T.; Huang, K. C. (Dept. Pharmacol., Univ. Louisville, Ky.). *Proc. Soc. Exp. Biol. Med.* 145 (4):1220-1224, 1974.

3409 ABSORPTION AND SECRETION IN THE RABBIT DUODENUM AND ILEUM. *(E.)* Limratana, V.; Leitch, G. J. (Dept. Physiol., Mahidol Univ., Bangkok, Thailand). *Proc. Soc. Exp. Biol. Med.* 145(4):1215-1219, 1974.

3410 THE EFFECT OF BENDROFLUMETHIAZIDE ON THE INTESTINAL ABSORPTION OF CALCIUM IN NORMOCALCAEMIC RENAL STONE FORMERS AND IN HYPERPARATHYROIDISM. *(E.)* Jorgensen, F. S.; Transbol, I. (Gentofte Hosp., Hellerup, Denmark). *Acta Med. Scand.* 195(1/2):33-36, 1974.

3411 IRON BINDING PROTEINS FOUND IN DUODENAL MUCOSA OF RATS DURING IRON TRANSPORT. *(E.)* Yoshino, Y.; Hiramatsu, Y. (Nippon Med. Sch., Tokyo, Japan). *J. Biochem. (Tokyo)* 75(2):221-228, 1974.

3412 COMPARISON OF DIHYDROTACHYSTEROL AND 5,6-TRANS VITAMIN D_3 ON INTESTINAL CALCIUM ABSORPTION IN PATIENTS WITH CHRONIC RENAL FAILURE. *(E.)* Gagnon, R.; Ogden, G. W.; Just, G.; Kaye, M. (Montreal Gen. Hosp., Canada). *Can. J. Physiol. Pharmacol.* 52(2):272-274, 1974.

3413 DISCRIMINATION OF MONOVALENT INORGANIC CATIONS BY "TIGHT" JUNCTIONS OF GALLBLADDER EPITHELIUM. *(E.)* Moreno, J. H.; Diamond, J. M. (Univ. California Med. Ctr., Los Angeles). *J. Membr. Biol.* 15(3):277-318, 1974.

See also, 3558, 3851, 3852, 4093.

MOTILITY

3414 A DEMONSTRATION OF VAGAL ADRENERGIC VASCULAR AND MOTOR INFLUENCES IN THE SMALL INTESTINE OF THE DOG. *(E.)* Martin, J. S.; Innes, D. L.; Tansy, M. F. (Temple Univ. Sch. Dentistry, Philadelphia, Pa.). *Surg. Gynecol. Obstet.* 138(1): 6-12, 1974.

Experiments with anesthetized dogs indicate that electric stimulation of the peripheral vagi can elicit both adrenergic and cholinergic vascular and intestinal motor events. In dogs which underwent bilateral vagectomy, peripheral vagal stimulation at the cervical level with stimuli of low voltage and frequency produced the classical cholinergic cardiovascular response. Application of the same stimulus to the distal end of the dorsal or ventral abdominal portion of the vagus, however, increased both femoral and mesenteric arterial pressure. In the majority of dogs, the systemic pressor effect was produced by peripheral stimulation of the dorsal portion of the vagus whereas a depressor effect was usually obtained by stimulation of the ventral trunk. The pressor response was blocked by the alpha adrenolytic, phenoxybenzamine. Supradiaphragmatic vagal stimulation also resulted in an observable reduction of jejunal motor activity. In view of the neurophysiologic and histochemical evidence advanced by other workers, these observations suggest that some vagal nerve fibers may exert a functional adrenergic influence upon the intestine and its circulation.

3415 AUGMENTATION OF THE NEURAL INHIBITORY RESPONSE OF THE LOWER ESOPHAGEAL SPHINCTER. *(E.)* Cohen, S. (Univ. Pennsylvania Hosp., Philadelphia). *Proc. Soc. Exp. Biol. Med.* 145(3):1004-1007, 1974.

The effect of lidoflazine and dipyridamole upon the nonadrenergic inhibitory response of the lower esophageal sphincter circular muscle was studied *in vitro*. Both dipyridamole and lidoflazine significantly potentiated the maximal inhibitory responses of the lower esophageal sphincter muscle to electrical stimulation during muscle contraction produced by either acetylcholine or KCl depolarization. Theophylline did not alter the magnitude of the inhibitory response. These studies indicate: 1) lower esophageal sphincter muscle neural inhibition may be potentiated by compounds known to block the intracellular uptake of adenosine, and 2) nonadrenergic inhibition of lower esophageal sphincter muscle may be mediated through adenosine triphosphate or a related purine nucleotide as proposed for other muscles responding similarly to dipyridamole and lidoflazine.

3416 A NERVOUS MECHANISM FOR DESCENDING INHIBITION IN GUINEA-PIG SMALL INTESTINE. *(E.)* Hirst, G. D. S.; McKirdy, H. C. (Dept. Physiol., Monash Univ., Clayton, Victoria, Australia). *J. Physiol. (Lond.)* 238(1):129-143, 1974.

Intracellular recordings were made from neurones in the myenteric plexus of guinea-pig small intestine under conditions in which these neurones received synaptic input from an adjacent segment of intestine. Most long synaptic pathways in the myenteric plexus

d in an anal direction. Such pathways could be
ited by either distension or transmural electri-
stimulation of the intestinal segment. Similar
muli evoked inhibitory junction potentials in the
cular muscle layer but only on the anal side of
stimulated region of intestine. The main fea-
es of the proposed inhibitory pathway include:
the afferent processes of the sensory neurone
stimulated by distension; 2) the efferent pro-
sses impinge on the cell body of an interneurone
may impinge directly on the cell body of an in-
itory neurone; 3) inhibitory fibers run in an anal
ection; and 4) inhibitory transmitter is assumed
be released from varicosities.

17 AN EVALUATION OF NEURAL INFLUENCES ON THE SPHINCTER OF ODDI IN THE DOG.

(E.) Tansy,
F.; Innes, D. L.; Martin, J. S.; Kendall, F. M.
ept. Physiol., Temple Univ., Philadelphia, Pa.).
J. Dig. Dis. 19(5):423-437, 1974.

ening pressures of the choledochoduodenal junction
re measured in anesthetized dogs before and after
gotomy. Measurements were also made in anesthe-
zed, vagotomized dogs prior to and during appro-
iate electrical stimulation of the severed ends
the peripheral and central vagi and of the peri-
eral splanchnic nerves. Vagotomy itself was not
sociated with significant changes in mean ductal
ening pressures. Central and peripheral vagal
imulation and peripheral splanchnic nerve stimu-
tion did not significantly change the mean opening
essure, but changes in circulating fluid volume
d have a significant effect. Reductions in sys-
mic arterial pressure were associated with a re-
ction in mean opening pressures, whereas increases
cardiovascular fluid volume were associated with
marked elevation of opening pressures. It is con-
uded that ductal opening pressures can be signi-
cantly changed by hydraulic factors but are ap-
rently unresponsive to direct nervous control.

18 GASTRIC EMPTYING AND SMALL INTESTINAL PROPULSION IN MICE FOLLOWING IRRADIATION OF
E ABDOMEN.

(E.) Frankendal, B. (Dept. Gynecologic
diation Therap., Umea Univ., Sweden). *Acta Radiol.*
her.) 12(6):529-540, 1973.

test meal containing a radioactive isotope
a$_2$^{51}CrO$_4$) was deposited in the stomach and its
istribution in the alimentary tract measured post
rtem in female NMRI mice treated by different ir-
diation schedules. Irradiation with 250 rad daily
to a total dose of 4,000 rad had no demonstrable
fect on gastric emptying. A daily dose of 500 rad
to a total dose of 1,000 and 2,000 rad inhibited
astric emptying and accelerated propulsion of the
ntents of the small intestine.

3419 SOME ACTIONS OF SYMPATHOMIMETIC AMINES AND THEIR ANTAGONISTS ON MOUSE SUPERFUSED ILEUM.

(E.) Large, B. J.; Wright, J. L. (Sch. Med., Leeds, England). *Br. J. Pharmacol.* 49(4):702-705, 1973.

Superfused segments of ileum from Tuck No. 1 mice exhibited spontaneous movements which were inhibited by sympathomimetic amines. Isoprenaline and epinephrine were about equipotent: 2-5 ng produced a 50% maximal response. Norepinephrine and phenylephrine were each about 1/15 as potent as the former drugs. Supersensitivity developed to all these agents when mice were "sympathectomized" with nerve growth factor antiserum (0.05 ml s.c. for 5 consecutive days) or 6-hydroxydopamine (2 separate injections of 50 mg/kg i.v., followed by a single injection of 100 mg/kg). The supersensitivity was more pronounced with the latter treatment. Responses to the amines were reduced by phentolamine mesylate (1 μg/ml) and propranolol hydrochloride (0.5 μg/ml), alone or in combination. Phenylephrine simply shortened the responses after β-adrenoceptor blockade. No qualitative changes were evident in the effects of the blocking agents after "sympathectomy."

3420 EFFECT OF L-DOPA ON DUODENAL MOTILITY IN THE DOG.

(Fr.) Patay, M.; van de Driessche, J.; Le Clec'h, G. (Univ. Hosp. Ctr., Rennes, France). *C. R. Soc. Biol. (Paris)* 167(8/9):1262-1265, 1973.

Pressure was measured in the duodenum of 25 chloralose-anesthetized mongrel dogs before and after slow (5 min) i.v. injection of 40 mg/kg L-dopa alone or after pericyazine (3 mg/kg), propranolol (600 μg/kg), or seryl trihydroxybenzyl hydrazine (40 mg/kg); epinephrine (7 μg/kg); phenylephrine (100 μg/kg); isopropyl norepinephrine (10 μg/kg); tyramine (250 μg/kg); and dopamine (40 μg/kg). After a short latent period, L-dopa caused significant inhibition of motility for 54 min or more. This inhibition affected the amplitude more than the frequency. Injection of sympathomimetic agents epinephrine, phenylephrine, isopropyl norepinephrine, tyramine, and dopamine) caused immediate but short-term (2-4 min) inhibition. In contrast to the action of α- or β-adrenergic blocking agents when they were administered simultaneously with L-dopa, injection of pericyazine and propranolol, resp., after L-dopa had no effect on the inhibitory action of L-dopa. It is suggested that L-dopa acts on both α- and β-adrenergic receptors.

3421 SYMPATHETIC INNERVATION OF THE GASTROINTESTINAL TRACT OF MAMMALS.

(E.) Krokhina, E. M. (Inst. Normal Path. Physiol., Acad. Med. Sci., USSR). *Arch. Anat. Microsc. Morphol. Exp.* 62(3):307-321, 1973.

The sympathetic components of the vegetative innervation of frozen, air-dried sections of the walls of the feline esophagus, stomach, duodenum, and ileum were examined using fluorescence microscopy. Varicose adrenergic fibers were detected in the intermuscular nerve plexus. The nerve ganglia of Auerbach's plexus contain 3 colonies of neurones, which have been found in the walls of the pyloric portion of the stomach and duodenum. The extrinsic muscular coat and the tunica muscularis mucosae of the gastrointestinal tract receive their adrenergic innervation from three sources: adrenergic fibers emerging from vascular and perivascular adrenergic plexuses in the intestinal wall; adrenergic fibers emerging from Auerbach's plexus; and adrenergic intramural neurons. The highest density of adrenergic terminals per unit of innervated area is in the circular layer of smooth muscle in the subdiaphragmatic section of the esophagus, the pyloric sphincter, and the walls of the duodenum and jejunum. Within the longitudinal muscles there is a well-developed adrenergic network which is partially adjacent to Auerbach's plexus. Adrenergic fibers often innervate other tissues in the gastrointestinal wall, such as loose connective tissue, glandular tissue, and the lymphatic nodes; these tissues often contain vascular adrenergic plexuses.

3422 THE SYMPATHETIC INNERVATION OF THE RAT GASTRIC FUNDUS. *(E.)* Heazell, M. A. (Dept. Pharmacol., King's Coll., London, England). *Arch. Int. Pharmacodyn. Ther.* 206(2):253-263, 1973.

A rat celiac artery-fundus preparation is described in which the activity of the fundal smooth muscle can be recorded *in vitro* during the electrical stimulation of the perivascular nerves of splanchnic origin. When the isolated celiac artery-fundus preparation was stimulated periarterially with relatively narrow pulses, a rapidly developing relaxation was observed. This response was reduced and eventually abolished by bethanidine, the blocking action of which was slightly reversed by dextroamphetamine and ephedrine but prevented or reduced in preparations which had been pretreated with either of these sympathomimetic amines. There was no response to periarterial stimulation of a celiac artery-fundus preparation from a rat which had received reserpine in a dose which caused noradrenaline depletion. When this reserpinized tissue was prepared as a strip and stimulated transmurally, there was a slowly developing process of relaxation. It is concluded that the rat gastric fundus receives a periarterial inhibitory innervation from the celiac ganglion and that these fibers are adrenergic. There is also an inhibitory response to the transmural stimulation of reserpinized tissues which involves nonadrenergic nerves.

3423 EFFECTS OF DIETARY SUPPLEMENTS OF WHEAT BRAN AND CELLULOSE ON FAECES AND BOWEL FUNCTION. *(E.)* Eastwood, M. A.; Kirkpatrick, J. R.; Mitchell, W. D.; Bone, A.; Hamilton, T. (Western Gen. Hosp., Edinburgh, Scotland). *Br. Med. J.* 4(5889):392-394, 1973.

In a study of bowel function in 8 healthy males (aged 25-43 yr) wheat bran or cellulose (16 g/day) was added to the diet for 4 weeks. Wet and dry stool weight increased significantly after ingestion of bran. The most striking increase was in the wet weight (107 to 174 g/day); the average daily increase in dry weight was equivalent to the amount of bran ingested. Intestinal transit time did not alter significantly. Fecal bile acids did not increase but were diluted (wet feces from 2.06 to 1.08 mg/g; dry feces from 8.1 to 1.9 mg/g). Serum cholesterol levels did not change. The effects of cellulose, tested on 4 of the 8 subjects, were similar to those of bran. The possible therapeutic effect of bran or cellulose in diverticular disease is apparently due to the ability of these substances to increase stool bulk.

3424 MECHANICAL AND ELECTRICAL ACTIVITIES OF COLD-STORED TAENIA CECUM WITH REWARMING. *(E.)* Fukuda, H.; Shibata, S. (Univ. Hawaii Sch. Med. Honolulu). *Am. J. Physiol.* 226(5):1060-1065, 1974.

3425 INTESTINAL MOTOR EFFECTS OF A UNIQUE ANALGESIC AGENT. *(E.)* Jacobs, G. R.; Burks, T. F. (Univ. Texas Med. Sch., Houston). *J. Pharm. Sci.* 63(5):787-789, 1974.

3426 COMPARISON OF IONIC EFFECTS ON LONGITUDINAL AND CIRCULAR MUSCLE OF CAT JEJUNUM. *(E.)* Conner, C.; Prosser, C. L. (Dept. Physiol., Biophys., Univ. Illinois, Urbana). *Am. J. Physiol.* 226(5):1212-1218, 1974.

3427 SIGNIFICANCE OF CERTAIN BIVALENT IONS TO THE MANIFESTATION OF THE ADRENALINE EFFECT ON THE SMOOTH MUSCLE OF THE STOMACH IN THE CAT (IN VITRO EXPERIMENTS). *(E.)* Papasova, M. P.; Miloushev E. A.; Loukanov, Y. B. (Med. Inst., Varna, Bulgaria). *Dokl. Bol. Akad. Nauk* 26(7):981-984, 1973.

3428 LEADING OFF ELECTRIC POTENTIALS FROM THE ALIMENTARY TRACT BY MEANS OF SURGICALLY IMPLANTED AGAR BRIDGES. *(E.)* Todorov, D. P. (Inst. Nutr., Sofia, Bulgaria). *Dokl. Bol. Akad. Nauk* 25(12):1721-1723, 1972.

3429 THE EFFECT OF VAGOTOMY ON GASTROINTESTINAL PROPULSIVE MOTILITY IN RATS SUBJECTED TO ADMINISTRATION OF PARATHYROID HORMONE AND PARATHYROIDECTOMY. *(E.)* Segerstrom, A. (Univ. Hosp., Uppsala, Sweden). *Upsala J. Med. Sci.* 78:55-59, 1973.

3430 VARIATIONS IN THE TONICITY OF THE SMALL BOWEL ASSOCIATED WITH GASTRIC SECRETORY DISORDERS. *(Ger.)* Stellamor, K. (Rudolfstiftung Hosp., Vienna, Austria). *Radiol. Clin. Biol.* 42 (6):516-528, 1973.

3431 ANTINICOTINIC ACTION OF PAPAVERINE ON THE INTESTINE. *(E.)* Bauer, V.; Kadlec, O.; Seferna, I. (Inst. Pharmacol., Charles Univ., Prague, Czechoslovakia). *Pharmacol. Res. Commun.* 6(1):35-46, 1974.

3432 THE RESPONSES OF THE MUSCULATURE OF THE DISTAL COLON OF THE NEWBORN RABBIT TO

MPATHETIC NERVE STIMULATION. *(E.)* Bhagat, C. I.
ac. Med., Univ. Natal, Durban, South Africa).
Afr. J. Med. Sci. 38(3/4):51-53, 1973.

33 INFLUENCE OF PHENFORMIN ON GASTRIC EMPTYING RATE. *(E.)* Gomez Perez, F. J.; Ryan, . R.; Staub, R. (Tulane Univ. Sch. Med., New Orleans, La.). *J. Clin. Pharmacol.* 14(5/6):261-263, 1974.

See also, 3770, 4059.

SECRETION AND METABOLISM

34 THE EFFECT OF PROSTOGLANDIN E_1 ON THE RELEASE OF GASTRIN AND GASTRIC SECRETION ON GS. *(E.)* Becker, H. D.; Reeder, D. D.; Thompson, . C. (Dept. Surg., Univ. Texas Med. Br., Galveston). *ndocrinology* 93(5):1148-1151, 1973.

ne effect of prostaglandin E_1 (PGE_1) on the basal nd food-stimulated concentrations of serum gastrin as studied in 5 adult mongrel dogs with denervated undic (Heindenhain) pouches. The PGE_1 infusion aused an 80% inhibition in the secretory response f the denervated fundic pouch to food, but it did ot alter the basal serum gastrin levels. After the nfusion was stopped, the gastric secretion rose to reater than control levels in the food-stimulated nimals. Because of this rebound effect, the total -hr Heidenhain pouch acid output in response to ood was unchanged. The results indicate that PGE_1 as a direct inhibitory effect on the parietal cells. he mechanism by which PGE_1 increases food-stimulated astrin levels may involve a diminished acid inhibiion of the antrum, a decreased antral motility, or n alteration in the catabolic pathways.

3435 CHOLANOIC (BILE) ACIDS IN HEPATIC AND NONHEPATIC TISSUES OF MINIATURE SWINE. *(E.)* Anonymous. *Lipids* 9(4):294-297, 1974.

3436 EFFECTS OF CALCIUM ON Na, K TRANSPORT BY PERFUSED MAIN DUCT OF RAT SUBMAXILLARY GLAND. *(E.)* Schneyer, L. H. (Univ. Alabama Med. Ctr., Birmingham). *Am. J. Physiol.* 226(4):821-826, 1974.

3437 GEL ELECTROPHORESIS OF WHOLE SALIVA AND ASSOCIATED HISTOLOGICAL CHANGES IN SUBMANDIBULAR GLANDS OF ISOPROTERENOL-TREATED RATS. *(E.)* Menaker, L.; Sheetz, J. H.; Cobb, C. M.; Navia, J. M. (Sch. Dentistry, Univ. Alabama, Birmingham). *Lab. Invest.* 30(3):341-349, 1974.

See also, 3752.

SECRETION AND METABOLISM

Stomach

438 THE VALUE OF A COOPERATIVE MULTICENTER STUDY FOR ESTABLISHING A TABLE OF NORMAL ALUES FOR GASTRIC ACID SECRETION AS A FUNCTION OF EX, AGE, AND WEIGHT. *(Fr.)* Bernier, J. J.; Vidon, .; Mignon, M. (St. Lazare Hosp., Paris, France). *iol. Gastroenterol. (Paris)* 6(4):287-296, 1973.

asal acid outputs and peak acid outputs after administration of histamine dihydrochloride (0.01 mg/kg ollowed, 1 hr later, by another injection of the ame dose), pentagastrin (3-6 μg/kg/hr), and swine astrin (2-5 μg/kg/hr) were measured in 53 subjects (38 men and 15 women) with no radiological or histological evidence of stomach disease. Values for the exchangeable potassium (K) pool were calculated from the subjects' age and weight. Acid output values were correlated with values for the exchangeable K pool rather than with the lean body mass since the latter includes extracellular liquid and the skeleton in addition to cells. The acid output correlated with the exchangeable K pool did not differ in either sex with the stimulant used, but the true acid output was about 30% higher in men than in women. Analysis of variations in the exchangeable K pool with age showed that the former decreased about 0.4%/yr at ages above 14 yr. Literature reports indicate that gastric acid secretion declines more sharply than this value above age 50 yr, but this could be explained by failure to exclude subjects who have gastritis or by the use of populations with lower body weights than those of Europeans. Tables are presented showing the exchangeable K pool as a function of sex, age, and weight. These tables should be used cautiously since larger numbers of subjects must be studied to verify the values.

3439 EFFECT OF TRITERPENOIDS RELATED TO CARBENOXOLONE UPON HUMAN PEPSINS AND PEPSINOGENS AND UPON BOVINE TRYPSIN AND CHYMOTRYPSIN. *(E.)* Waft, L. A.; Roberts, N. B.; Taylor, W. H. (United Liverpool Hosp., England). *Clin. Sci. Mol. Med.* 46(4):519-526, 1974.

Sixteen triterpenoid compounds related to glycyrrhetic acid were tested for anti-pepsin, anti-pepsinogen, anti-trypsin, and anti-chymotrypsin activity. Their actions were compared with the known inhibitory actions of carbenoxalone, which is clinically effective in the healing of chronic gastric ulceration in man. 3-*O*-lauroyl-11-oxo-18α-olean-12-en-30-oic acid, known to be clinically ineffective in the healing of gastric ulceration, was without significant inhibitory effect on any of the enzymes tested. Good anti-pepsin activity was associated with cleaving the A ring with retention of a C-3 carboxyl group and a free C-30 carboxyl group. Good anti-pepsinogen activity was associated with removing the C-11 oxo group and/or switching the carboxyl group from C-30 to C-28. These results provide a guide for the synthesis of new anti-pepsin and potential anti-ulcer triterpenoid derivatives. Homologous enzymes, human pepsin 3 and swine pepsin A, were affected by each of the 16 compounds to a remarkably similar degree. The correlation between effects of the compounds on pairs of enzymes may thus be used as a measure of the structural similarity of the enzymes. The correlation coefficients are high among individual pepsins and individual pepsinogens. Triterpenoids with high anti-trypsin and anti-chymotrypsin activity had little in common other than a substituted cyclic group. The compounds which inhibit trypsin and chymotrypsin may be of use in diseases in which pancreatic enzymes are released (e.g., acute pancreatitis and pancreatic fistulas).

3440 RADIOIMMUNOASSAY OF GASTRIN. FASTING SERUM LEVELS IN HUMANS WITH NORMAL AND HIGH GASTRIC ACID SECRETION. *(E.)*

Gedde-Dahl, D. (Univ. Hosp., Rikshospitalet, Oslo, Norway). *Scand. J. Gastroenterol.* 9(1):41-47, 1974.

A radioimmunoassay for gastrin giving accuracy, sensitivity and precision parameters, using rabbit anti-albumin-SHG as antiserum and Dextran-coated charcoal for separation is described. In 298 patients with different diseases but with normal or high pentagastrin-stimulated gastric acid secretion, fasting serum gastrin concentrations were determined. A mean of 65.9 pg/ml and a normal range of 10 to 150 pg/ml were found in the 205 patients with normal gastric acid secretion. No differences were found between sexes or age groups, nor was any difference found between patients with normal and high gastric acid secretion. No correlation was found between basal acid output or maximal acid output and fasting serum gastrin concentration in these patients. Persons with ulcus corporis ventriculi had significantly higher fasting serum gastrin levels than others whereas peptic ulcer patients did not differ from normals.

3441 GASTRIC STIMULATION BY INTRAVENOUS INJECTION OF CHOLECYSTOKININ AND SECRETIN IN FISTULA CHICKENS. *(E.)*

Burhol, P. G. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(1):49-53, 1974.

The effect of i.v. injection of cholecystokinin and secretin on gastric secretion was studied in 10 fistula chickens. Cholecystokinin elicited a significant, dose-dependent and fivefold rise in the gastric H^+ secretion, whereas the pepsin secretion showed a slight and not significant rise. It is suggested that cholecystokinin compared with pentagastrin may be a full agonist for stimulation of gastric H^+ and a partial agonist for stimulation of pepsin secretion in the chicken. Secretin caused a significant, dose-dependent and some threefold increase both in the gastric H^+ and the pepsin secretion. It is proposed that secretin stimulates the gastric secretion in the chicken by a direct action on the gastric mucosa. It is concluded that the gastric stimulation by the intestinal hormones cholecystokinin and secretin in this study, may be taken to support the hypothesis that the intestinal phase seems to be more important in the physiological stimulation of gastric secretion in birds than in mammals.

3442 EFFECTS OF ELEMENTAL DIETS ON GASTRIC EMPTYING AND GASTRIC SECRETION IN MAN. *(E.)*

Bury, K. D.; Jambunathan, G. (Dept. Surg., Univ. Toronto, Canada). *Am. J. Surg.* 127(1):59-64, 1974.

The patterns of gastric emptying and acid secretion were documented and compared after rapid ingestion of 2 different volumes of 4 test meals. The test meals included: (1) water; (2) blenderized food with osmolality 1027, chloride 21.9, fat 6.7, protein 16, and carbohydrate 121 g/100 ml; (3) Vivonex (Orange) with osmolality 1247, chloride 69.1, fat 0.413, protein 11.438, and carbohydrate 127.12 g/100 ml; and (4) Flexical (Orange) with osmolality 1158, chloride 56.4, fat 22.28, protein 14.1, and carbohydrate 103.73 g/100 ml. The Flexical diet contained fat as a combination of whole fat and middle chain triglycerides. The blenderized diet consisted of eggs, bread, orange juice, apple sauce, lipomul, and added sugar. The half-life of the 300 ml elemental diets was significantly longer than that of the blenderized food, and total emptying time was prolonged to 118 and 141% of the control diet with Flexical and Vivonex, respectively. All 600 ml test meals, except water, caused an initial increase in gastric volume and total emptying time was prolonged. The 300 ml blenderized test diet stimulated significantly greater acid output from the stomach in the first hour after ingestion. Except for 600 ml of Flexical, all 600 ml diets stimulated significantly higher acid outputs than did 300 ml of the same test meal. Total acid secretion was greatest in response to blenderized test meals. All test diets (except water) were significantly hyperosmotic, with similar pH values. After all test meals (except water) osmolality of gastric contents progressively decreased towards isotonicity. The osmolality of the gastric contents increased with time after water ingestion. It is concluded that elemental diets should be ingested as frequent small feedings or continuous feedings.

3443 EFFECTS OF ACID IN STOMACH AND DUODENUM UPON THE GASTRIC MYOELECTRICAL ACTIVITY IN MAN. *(E.)*

Couturier, D.; Roze, C.; Vasconcellos, D.; Accary, J. P.; Debray, C. (Bichat Hosp., Paris, France). *Digestion* 9(6):502-513, 1973.

The period of the pacesetter potentials in the normal human stomach was studied when infusing HCl (75 mEq/l) or saline in the stomach or duodenum. When

350 ml volume of saline was infused into the stom- n, an 11% increase of the pacesetter potentials riod was observed. With 350 ml of acid solution, e maximum increase was 40%. This occurred 8 min ter the onset of infusion, at the moment when the rum gastrin level was significantly lowered. When e acid solution was infused into the duodenum, a ow rate of acid dependent increase of the paceset- r potentials period occurred (43% with 4 ml/min). line induced no change. A single i.v. injection secretin (0.5 U/kg) induced an increase in the cesetter potentials period whose maximum (35%) curred 4 min after the injection. The results ggest that gastric myoelectrical activity may be fected by a hormonal regulation in which endogenous cretin and gastrin would determine opposite res- nses.

44 THE EFFECT OF ANTRAL DENERVATION ON GASTRIC SECRETION IN THE DOG. *(E.)* Nundy, .; Baron, J. H. (Hammersmith Hosp., London, England). . *J. Surg.* 61(2):154-156, 1974.

e effect on gastric secretion of cutting the antral erves was studied in dogs with a previous complete roximal gastric vagotomy, with an incomplete proxi- al gastric vagotomy, and with otherwise intact agi. There was no change in insulin- and pentagas- rin-stimulated acid output in dogs with a previous agotomy. The dog with otherwise intact vagi showed o change in insulin-stimulated acid output but there as a diminished acid response to low doses of pen- agastrin. These results, if confirmed in man, ould suggest that the antral vagal nerves have no linically significant effect on gastric acid secre- ion.

445 GASTRIC H^+, Cl^-, AND PEPSIN SECRETION IN FISTULA DOGS WITH HISTAMINE, BETAZOLE, RIAZOLE, AND N-METHYLHISTAMINES. *(E.)* Hirschowitz, . I.; Hutchison, G. A. (Dept. Med., Univ. Alabama, irmingham). *Am. J. Physiol.* 226(3):656-661, 1974.

ix dogs with gastric fistula were stimulated dose esponsively in 6 or 7 successive 45 min steps with istamine (2-150 μg base/kg-h); 2 ring analogs; be- azole (30-3,000 μg/kg-h), and triazole (3-300 μg/ g-h); and 2 side-chain analogs; *N*-methylhistamine 6-60 μg/kg-h), and *N*-dimethylhistamine (3-160 μg/ g-h). Each experiment was duplicated. Dose-respon- ive volume, H^+ and Cl^- output, could be described by ichaelis-Menten-type kinetics from which can be alculated V_{max} and K_m (the dose giving 50% of V_{max} utput). For acid output with histamine, *N*-(Me)-his- amine, *N*-(Me)$_2$-histamine, betazole, and triazole, V_{max} was 18.0, 16.2, 17.9, 14.3, and 13.3 meq H^+/30 in, respectively, and K_m was 17.5, 14.4, 18.5, 597, and 23 μg/kg-h, respectively. The ring analogs, etazole and triazole, therefore, appear to be the less potent electrolyte stimulants. Pepsin was inimally stimulated by histamine or the methylhis- tamines, but was stimulated by betazole and by tria- zole. The peak pepsin output values were 4, 10, 12, 36, and 45%, respectively, of maximum rates with vagal stimulation.

3446 CYCLIC GMP RESPONSE IN VIVO TO CHOLINERGIC STIMULATION OF GASTRIC MUCOSA. *(E.)* Eichhorn, J. H.; Salzman, E. W.; Silen, W. (Harvard Med. Sch., Boston, Mass.). *Nature* 248(5445):238-239, 1974.

To investigate the possibility that cyclic guanosine 3',5'-monophosphate (cGMP) might be a mediator for cholinergic nervous stimuli in the stomach, an *in vivo* preparation making possible the direct stimulation of the vagus nerves was devised. Acid secretion was demonstrated by measurement of the pH of the gastric mucosal surface. Sham operations produced no change in mucosal cGMP content. Electrical stimulation for 1 minute of 30 pulses (10 ms, 22V) s^{-1} to the distal thoracic vagus nerves cut just above the diaphragm more than doubled mucosal cGMP in the fundus of the stomach but did not change antral mucosal cGMP. Pretreatment with i.v. atropine (0.2 mg/kg^{-1}), a cholinergic antagonist, prevented the increase in fundic mucosal cGMP. Infusion of ACh iodide (0.05 mg in 1 min) into the celiac artery produced a 2-fold increase in fundic mucosal cGMP and no change in the antrum. Vagal stimulation achieved by hypoglycemia after i.v. injection (0.6 units kg^{-1} in a bolus) of crystalline zinc insulin (blood sugar below 50 mg/100 ml in all dogs) caused a nearly 2-fold increase in fundic cGMP with no change in the antrum. The fundus was resected in 4 dogs with vagal innervation of the antrum preserved intact. After removal of this acid-secreting area, vagal stimulation still failed to alter antral mucosal cGMP. It is concluded that these data demonstrate an association between several types of cholinergic stimulation of the stomach *in vivo* and an increase in canine fundic mucosal cGMP. Possibly cGMP may serve as a second messenger for ACh, the first messenger of cholinergic stimuli.

3447 SALICYLATE EFFECTS ON GASTRIC ACID SECRETION. *(E.)* Glarborg Jorgensen, T.; Kaplan, E. L.; Peskin, G. W. (Rothschild Surg. Res. Lab., Chicago, Ill.). *Scand. J. Clin. Lab. Invest.* 33(1):31-38, 1974.

The effect of sodium salicylate on gastric acid secretion was studied in frog (*rana pipiens* or *rana catesbiana*) gastric mucosa *in vitro*, which allows continuous titration of secreted hydrogen ions. When added to either side of the membrane, sodium salicylate diminished both basal and pentagastrin-stimulated acid secretion in a dose-related manner. The dose of submucosal salicylate necessary to produce the same effect as mucosal side addition was approximately twice as high. It is concluded that the theory is supported that salicylate inhibition of acid secretion may be the result of changes in cell metabolism leading to local uncoupling of oxidative phosphorylation.

3448 SITES OF ORGANIC ACID PRODUCTION AND ABSORPTION IN THE EQUINE GASTROINTESTINAL TRACT. *(E.)* Argenzio, R. A.; Southworth, M.; Stevens, C. E. (New York State Vet. Coll., Cornell Univ., Ithaca). *Am. J. Physiol.* 226(5):1043-1050, 1974.

3449 GASTRIC MUCOSAL BARRIER - RECENT ADVANCES. *(E.)* Ivey, K. J. (Roy. Prince Alfred Hosp., Sydney, Australia). *Acta Hepato-Gastroenterol.* 20(6):524-531, 1973.

3450 MEASUREMENT OF GASTRIC ACID SECRETION BY CONDUCTIVITY. *(E.)* Lawrence, A. J.; Smith, G. M. (Dept. Pharmacol., Univ. Coll. London, England). *Eur. J. Pharmacol.* 25(2):383-389, 1974.

3451 PLASMA GASTRIN CONCENTRATIONS IN NORMAL SUBJECTS AND IN PATIENTS WITH DISEASES OF THE STOMACH, LIVER, KIDNEYS, AND PANCREAS. *(Ger.)* Dorner, M.; Lackas, S.; Kaess, H. (Med. Clin., Univ. Heidelberg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1409-1411, 1972.

3452 EFFECT OF VAGAL STIMULATION OF THE SERUM GASTRIN CONCENTRATION IN MAN. *(Ger.)* Feurle, G.; Ketterer, H.; Becker, H. D.; Fuchs, K.; Dreutzfeldt, W. (Med. Polyclin., Univ. Heidelberg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1411-1412, 1972.

3453 INTERFERENCE OF GASTROINTESTINAL HORMONES WITH STOMACH SECRETION. *(Ger.)* Kaess, H.; Heinzmann, D.; Kurzhals, R. (Med. Clin., Univ. Heidelberg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1407-1409, 1972.

3454 EFFECT OF HYDROCORTISONE ON THE MITOTIC CYCLE OF MUCUS-PRODUCING CELLS IN THE EPITHELIUM OF THE GASTRIC FUNDUS. *(Rus.)* Avetisian, A. A. (Inst. Med. Genetics, Moscow, USSR). *Biull. Eksp. Biol. Med.* 76(9):101-103, 1973.

3455 EFFECT OF SECRETIN ON GASTRIC SECRETION STIMULATED BY CAFFEINE. *(Sp.)* Peralta, C. G.; Piskorz, E.; Coronado Quesada, E.; Rubio, H. H. (Juan A. Fernandez Hosp., Buenos Aires, Argentina). *Acta Gastroenterol. Latinoam.* 5(3):113-116, 1973.

3456 EFFECT OF PROLONGED THERAPY WITH DIFFERENT AGENTS ON GASTRIC ACID-PEPTIC SECRETION. (NEUTRALIZERS, ANTIPEPTICS AND ANTICHOLINERGICS). *(E.)* Mazure, P. A.; Cosen, J. N. (Alejandro Posadas Polyclin., Buenos Aires, Argentina). *Acta Gastroenterol. Latinoam.* 5(3):117-123, 1973.

3457 A COMPARISON BETWEEN GASTRIC ACID MAXIMAL OUTPUT STIMULATED BY PENTAGASTRIN AND HISTOLOG R. *(Por.)* Zaterka, S.; Lima, F. L. de A.; Moraes Filho, J. P. P.; Bettarello, A. (Fac. Med., Univ. Sao Paulo, Brazil). *Arq. Gastroenterol. S. Paulo* 11(1):23-27, 1974.

3458 STEADY INTRAGASTRAL pH MEASUREMENT AFTER APPLICATION OF ANTACID DRUGS. *(Ger.)* Sommer, H.; Kasper, H.; Herzberger, U. (Med. Clin., Univ. Wurzburg, Germany). *Med. Klin.* 68:1500-1503, 1973.

3459 THE EFFECT OF INFUSED SOLUTION OF FREE HEMOGLOBIN ON THE SECRETORY ACTIVITY OF THE STOMACH IN DOGS. *(Pol.)* Schier, J.; Rudowski, W.; Daszynski, J.; Moscicka, M. (Inst. Hematol., Warsaw, Poland). *Pol. Tyg. Lek.* 28(38):1449-1453, 1973.

3460 EFFECT OF ATROPINE ON BASAL AND FOOD-STIMULATED SERUM GASTRIN LEVELS IN MAN. *(E.)* Becker, H. D.; Reeder, D. D.; Thompson, J. C. (Univ. Texas Med. Br., Galveston). *Surgery* 75(5):701-704, 1974.

See also, 3434, 3749.

SECRETION AND METABOLISM

Pancreas

3461 EFFECTS OF STARVATION ON AMYLASE STORAGE IN MOUSE PANCREAS AND PAROTID GLAND: A BIOCHEMICAL AND MORPHOMETRIC STUDY. *(E.)* Carlsoo, B.; Danielsson, A.; Helander, H. F. (Dept. Histol., Anat., Univ. Umea, Sweden). *Acta Hepatogastroenterol.* 21(1):48-57, 1974.

Fasting-induced changes in the mouse exocrine pancreas and parotid gland were investigated. Pancreatic amylase content decreased from 20 to 9 U/mg tissue wet weight after a 12-hr fast, whereas parotid gland amylase increased from 6 to 10 U/mg tissue wet weight. There was a close correlation between the amylase content of the individual glands and the volume density of their secretory granules, as measured on electron micrographs. Similarly, a close correlation was demonstrated between amylase content and numbers of secretory granules/unit area. In the parotid gland the doubling of amylase content after fasting was paralleled by a doubling of the volume density of secretory granules. The number of granules increased by about 40%. This discrepancy is explained by the increased mean granule diameter observed after fasting (0.91 μ versus 0.77 μ in nonfasted animals).

462 THE EFFECTS OF GASTRIC EXCLUSION OPERATIONS ON PANCREATIC EXOCRINE SECRETION. *(E.)*
homas, J. W.; Mason, E. E. (Dept. Surg., Univ.
entucky, Lexington). *Surgery* 75(3):461-470, 1974.

hree dogs with pancreatic fistulas were subjected in
ccession to 66% gastric bypass, antral exclusion,
nd 66% gastric resection. Three feeding experiments
ere done after each operation. Each consisted of a
tandard meal and collection of nine 30-min samples
f pancreatic juice. The volume, bicarbonate, and
rotein content of each sample was determined. Pan-
reatic juice was continuously replaced into the
uodenum. The principal effect of the gastric ex-
lusion operations was on the pattern of secretion
ather than on the quantity of secretion. The effects
f gastric bypass were a late rise in volume secre-
ion and a 30-min delay in peak protein secretion.
owever, delay in the peak protein secretion follow-
g gastric resection was 60 min; therefore, the
mpairment in mixing of food and pancreatic juice
ould not be as great after gastric bypass as after
comparable gastric resection.

463 TRANSPORT OF AMINO ACIDS IN RAT PANCREAS DURING DEVELOPMENT. *(E.)* Cheneval, J. P.;
hnstone, R. M. (Dept. Biochem., McGill Univ.,
ntreal, Canada). *Biochim. Biophys. Acta* 345(1):
-26, 1974.

64 INVESTIGATION OF PANCREAS AND GALLBLADDER FUNCTION IN CHILDREN. I. METHODS. *(Ger.)*
swald, P.; Niessen, K. H.; Hartmann, F.; Droste,
.; Brugmann, G.; Schmidt, K. (Children's Clin.,
iv. Tubingen, Germany). *Z. Kinderheilk.* 116(4):
1-290, 1974.

3465 PANCREATIC GLUCAGON, IONIZED, ULTRAFILTRABLE AND TOTAL CALCIUM IN SERUM FOLLOWING INTRAMUSCULAR INJECTION OF PENTAGASTRIN. *(E.)* Schwille, P. O.; Hard, H.; Scholz, D.; Decker, R. (Fac. Med., Univ. Erlangen-Nuremberg, West Germany). *Acta Hepatogastroenterol.* 21(1):62-69, 1974.

3466 DIRECT EFFECTS OF THE PROSTAGLANDINS E_1 AND $E_{2\alpha}$ ON THE ACTIVITY OF PANCREATIC TRIGLYCERIDE LIPASE. *(E.)* Mentz, P.; Forster, W.; Giessler, C. (Sch. Med., Martin-Luther-Univ., Halle-Wittenberg, Germany). *Pol. J. Pharmacol. Pharm.* 26(1/2):237-241, 1974.

3467 CHRONIC ALCOHOLISM AND ENDOGENOUS CHOLECYSTOKININE-PANCREOZYMINE (CCK-PZ). *(E.)* Palasciano, G.; Tiscornia, O. M.; Hage, G.; Sarles, H. (INSERM, Marseille, France). *Biomedicine* 20(2):94-97, 1974.

3468 SECRETIN. *(Sp.)* Chojkier, J. (A. Posadas Polyclin., Buenos Aires, Argentina). *Acta Gastroenterol. Latinoam.* 5(3):131-149, 1973.

3469 TECHNIQUES FOR MEASURING AMYLASE SECRETION FROM PIECES OF MOUSE PANCREAS. *(E.)* Danielsson, A. (Dept. Histol., Univ. Umea, Sweden). *Anal. Biochem.* 59(1):220-234, 1974.

See also, 3488, 3539, 4110.

SECRETION AND METABOLISM

Hepatobiliary Tract

70 HISTODYNAMIC INTERPRETATION OF BILIARY EPITHELIO-MESENCHYMATOUS REACTIONS IN EX-
RIMENTAL CHOLESTASIS. *(E.)* Serrao, D.; Cardoso,
(St. John's Hosp., Asprela, Oporto, Portugal).
thol. Eur. 8(3):219-234, 1973.

gs were subjected to the following operative pro-
dures: total interruption of the terminal bile
ct, reproducing total cholestasis; segmental inter-
ption of the biliary tree, reproducing lobar chole-
asis; choledocho-caval anastomosis, producing chol-
ic saturation; partial ligature of the posterior
na cava thoracic segment, producing venolymphatic
asis; and cholestasis and hepatic venous stasis.
ese procedures resulted in accentuated cholestasis
all animals. Based on these and previous results,
is suggested that the connective atmosphere of the
liary ducts is really the supporting tissue of the
ribiliary lymphatic circulation which begins in a
pillary network connecting with the basal membrane
the third-order ducts, from the sites where
nalicula perforate Glisson's capsule and become ducts.
rther, the intrabiliary pressure, particularly the bilio-lymphatic reflux, associated with the general conditions of lymph drainage from the liver, is the principal factor involved in peribiliary mesenchymatous activation. Once initiated, this pressure soon becomes independent, progressing into irreversible fibrosis with portal hypertension.

3471 HEPATOMA--FOETAL Phe-tRNA ALSO PRESENT IN NORMAL RAT LIVER. *(E.)* Mushinski, J. F. (Natl. Cancer Inst., Bethesda, Md.). *Nature* 248 (5446):332-334, 1974.

Aminoacyltransfer(t) RNAs from mouse and rat tumors and normal tissues were compared using reversed phase chromatography on RPC-5 columns. The results showed an early eluting peak of phenylalanyl (Phe)-tRNA in Morris hepatomas but not in normal liver. Identical amounts of liver tRNA and hepatoma tRNA were then aminoacylated with DEAE and G-10 enzymes from liver and tumor. The G-10 enzymes increased the total incorporation into the major peak of Phe-tRNA 2- to 3-fold over the DEAE enzymes, while increasing the incorporation into the minor peak more than 15-fold; thus a minor peak not seen in liver tRNA charged with aged DEAE enzyme became very prominent when G-10 enzyme was used. Although there was a distinct difference in the prominence of the minor Phe-tRNA from normal liver and from hepatomas no matter which aminocylating enzyme was used, it was not possible to refer to a tumor-specific peak of Phe-tRNA. No increases in the minor Phe-tRNA were found in regenerating liver tested 1, 2, 3, 7, or 10 days after partial hepatectomy. The data indicate that although both the minor Phe-tRNA and α-fetoprotein may represent increased activation of genes primarily associated with embryogenesis or rapid growth conditions, a direct correlation does not exist between them.

3472 LIVER-SPECIFIC ANTIGENS OF DIFFERENT SPECIES. II. LOCALIZATION OF A MEMBRANE ANTIGEN AT CELL SURFACE OF ISOLATED HEPATOCYTES. *(E.)* Hopf, U.; Meyer Zum Buschenfelde, K. H.; Freudenberg, J. (2nd Dept. Intern. Med., Univ. Mainz, Germany). *Clin. Exp. Immunol.* 16(1):117-124, 1974.

The livers from Sprague-Dawley rats and young rabbits were kept moist at 37 C. The livers were perfused for 5 min with physiological saline followed by EMBA (Eagle's medium plus 2.5% bovine serum albumin) for a similar period. The perfusion rates were maintained at 18 ml/min for the rat and 24 ml/min for the rabbit livers. The tissue was then cut into small pieces, incubated in 20 ml EMBA in an oxygen atmosphere at 37 C and shaken in a waterbath for 5 min. The cell suspension was filtered through nylon wool. Human hepatocytes were isolated similarly, the liver tissue having been obtained by needle biopsy. When studied by phase contrast microscopy or by the luciferase test, the preparation contained about 95% live hepatocytes. Immunofluorescence studies located the lipoprotein at the cell surface of isolated hepatocytes. Indirect immunofluorescence confirmed results obtained by passive hemagglutination that suggest this is an organ-specific membrane lipoprotein, not species-specific. Cryostat sections of kidney, thyroid, and skeletal muscle showed no membrane fluorescence when monospecific heteroimmune sera were applied. The findings of this study will be helpful in determining the mechanism of different cytotoxic immune reactions under defined conditions.

3473 INCREASE IN THE PHAGOCYTIC ACTIVITY OF THE RETICULOENDOTHELIAL SYSTEM IN THE LIVER AFTER SPLENECTOMY. *(It.)* Petrelli, F.; Marsili, G. (Inst. Gen. Physiol., Univ. Camerino, Italy). *Boll. Soc. Ital. Biol. Sper.* 48(22):911-914, 1972.

The phagocytic activity of the liver was investigated in female splenectomized Wistar WMZ rats by histological examination of the liver and by analysis of the kinetics of the clearance of colloidal carbon from the blood. While no differences were found between intact controls and rats splenectomized 24 hr previously, carbon disappeared more rapidly from the blood of rats splenectomized 60 days before. In these rats Benacerraf's phagocytic index was significantly increased. This increase was not due to a difference in the relative weight of the liver, but to an increase in the activity of the reticulohistiocytary system in the liver as a result of hyperplasia. These splenectomized rats had larger numbers of Kupffer cells in their livers than controls, and the Kupffer cells were filled with carbon particles.

3474 PREVENTION OF HALOTHANE INDUCED CHANGES IN RAT LIVER ENZYMES BY 3-AMINO-1,2,4-TRIAZOLE. *(E.)* Langhans, W.; Schimassek, H. (Inst. Biochem., Univ. Heidelberg, Germany). *Biochem. Pharmacol.* 23(2):403-409, 1974.

It has already been shown that 3-amino-1,2,4-triazole inhibits the biological transformation of halothane in liver. Inhibition of the transformation of halothane prevents some of the changes in liver metabolism observed after halothane treatment. Changes in enzyme activities were measured as sensitive indicators. Halothane and its stable metabolite trifluoracetate greatly increased the activity of the mitochondrial glycerol-3-phosphate oxidase. Pretreatment of male Wistar rats with aminotriazole (75 mg/100 g i.p.) inhibited the activity increase caused by halothane (1 vol% halothane-O_2 1 hr/day for 14-17 days), but not by trifluoracetate (130 μM/100 g in drinking water). Aminotriazole also prevented the increase in the activity of malic enzyme, reduced nicotinamide adenine dinucleotide diphosphate-oxidase, and lactate dehydrogenase produced by halothane treatment. The induction of glycerol-3-phosphate oxidase was not counteracted by actinomycin D because actinomycin itself increased the activity of glycerol-3-phosphate oxidase.

3475 PREVENTION OF CARBON TETRACHLORIDE-INDUCED NECROSIS BY INHIBITORS OF DRUG METABOLISM--FURTHER STUDIES ON THEIR MECHANISM OF ACTION. *(E.)* Castro, J. A.; De Ferreyra, E. C.; De Castro, C. R.; De Fenos, O. M.; Sesame, H.; Gillette, J. R. (Lab. Chem. Bio-Toxicol., CITEFA, Buenos Aires, Argentina). *Biochem. Pharmacol.* 23(2): 295-302, 1974.

Liver necrosis caused by carbon tetrachloride is known to be decreased by the administration of 2-diethylaminoethyl 2,2-diphenylvalerate, ethyl 2-diethyl-aminoethyl-2-phenyl-2-ethyl malonate, ethyl N-(2-diethylaminoethyl)2-phenyl-2-ethyl malonate, ethyl 2-diethylaminoethyl 2-ethyl-2-butyl malonate, 2-diethylaminoethyl 2-phenyl (2-propene) 4-penten-1-oate, 2,4,-dichloro-6-phenyl phenoxyethyl diethylamine, and 2,4-dichloro-6-phenyl phenoxyethylamine. Although these substances inhibit cytochrome P-450 dependent drug-metabolizing enzymes in liver microsomes, they apparently do not evoke their protective effects by slowing the elimination of carbon tetrachloride. In fact, 2-diethylaminoethyl 2,2-diphenylvalerate (50 mg/kg i.p.), but none of the other inhibitors, partially prevented the impairing effects of carbon tetrachloride (2.5 ml/kg p.o. or 20 or 30% in olive oil i.p.) on cytochrome P-450 in Sprague-Dawley rat liver. Although 2-diethyinoethyl 2,2-diphenylvalerate markedly decreased e liver necrosis and the rise in serum isocitrate ydrogenase caused by carbon tetrachloride, it ly partially prevented the carbon tetrachloride-duced decrease in body temperature. The protec-ve effect of 2-diethylaminoethyl 2,2-diphenyl-lerate can be attributed to the inhibition of crosomal enzymes that catalyze the conversion of bon tetrachloride to an active metabolite.

6 MICROSOMAL ENZYME ACTIVITY IN PERFUSED RAT LIVER.

(E.) Bartosek, I.; Guaitani, Garattini, S.; Simonazzi, I. ("Mario Negri" t. Pharmacol. Res. Milan, Italy). *Biochem. rmacol.* 23(3):599-605, 1974.

activities of microsomal enzymes were observed g perfusion of livers isolated from both normal phenobarbital treated male Sprague-Dawley rats. hydroxylation of aniline (5 μM) and the *O*-de-hylation of *p*-nitroanisol (1.5 μM) did not de-ase substantially (10%) in the 9000 g fraction pared from livers perfused for 4 hrs. *N*-demethyla-n of aminopyrine (5 μM) was reduced by 60% in same experimental conditions. A similar de-ase of *N*-demethylation was also observed when ers were isolated from animals treated with nobarbital (50 mg/kg i.v.). The content of cyto-ome P-450 in the microsomes was stable during -hr perfusion of isolated liver. The decrease of emethylation of aminopyrine could be partly re-red by the simultaneous infusion of nicotinic d (0.2 mM), which is a precursor of nicotinamide nine dinucleotide and nicotinamide adenine dinu-otide phosphate biosynthesis. Accurate control experimental conditions is a prerequisite when technique of perfusion of isolated liver is d for studies on drug metabolism. These results erline the problem that lack of necessary cofac-s may change the parameters of drug transforma-n.

7 EFFECTS OF DIETARY CHOLESTEROL ON BILE ACID SYNTHESIS IN LIVER AND HEPATOMAS.

Bricker, L. A.; Marraccini, J. V.; Rosenblatt, Kozlovskis, P. L.; Morris, H. P. (Univ. Miami Med., Florida). *Cancer Res.* 34(3):449-453, .

effects of cholesterol feeding on bile acid pro-ion *in vitro* in liver were contrasted with se in a strain of Morris hepatoma active in sterol hesis. The Morris hepatoma 3924A tumors were splanted in the right thighs of recipient ACF/ rats. Animals were kept on either a normal na rat chow low-cholesterol diet or a high esterol diet, consisting of 5% cholesterol and oleic acid, to which sufficient cholesterol-1α, H had been added to give the cholesterol a ific radioactivity of 3750 dpm/μmole. Pretreat-with the high-cholesterol diet suppressed the ity of the liver to convert acetate to bile . This suppressed liver from the cholesterol-animal converted dietary sterol (instead of ex-ally added acetate) to bile acid. When 500 mg lices of Morris hepatoma are incubated with acetate-2-^{14}C, this highly malignant, undifferentiated adenocarcinoma of liver incorporates acetate into bile acid, and in amounts comparable to that of liver. There is no suppressive effect of dietary cholesterol on this synthetic process. This tissue was essentially unable to use dietary cholesterol as a precursor for synthesis of its own bile acid, despite its easy accessibility in the circulation *in vivo*. It is concluded that bile acid production *de novo* from acetate in liver is suppressible by dietary cholesterol in a fashion comparable with, and related to, the cholesterol negative feedback phenomenon. In liver, a dual, reciprocating precursor supply is available for bile acid formation. Dietary cholesterol functions in the presence of blockaded sterol synthesis as the sole precursor of bile acid. In the presence of a high-cholesterol diet, liver has the ability to convert mevalonate and stored dietary cholesterol simultaneously to bile acid. The Morris hepatoma 3924A is active in bile acid production from both acetate and mevalonate, but these syntheses are unaffected by dietary cholesterol. Dietary cholesterol cannot itself be utilized by the tumor for bile acid synthesis.

3478 A NOVEL METHOD FOR THE SEPARATION AND IDENTIFICATION OF BILE ACIDS AND PHOSPHOLIPIDS OF BILE ON THIN-LAYER CHROMATOGRAMS.

(E.) Goswami, S. K.; Frey, C. F. (Wayne County Gen. Hosp., Eloise, Mich.). *J. Chromatogr.* 89(1):87-91, 1974.

A method is described which successfully accomplishes the separation of several classes of bile lipids on a single plate making possible a direct comparison between different bile lipid components such as cholesterol, free and conjugated bile acids, lecithin and lysolecithin. Bile samples were collected from gallstone patients by puncture of the gallbladder during operation. The spray reagent was the same as used for phospholipid detection. About 10- μg samples of each of free and conjugated bile acids and phospholipids were applied as spots of 4 mm diameter at 1.5 cm above the bottom edge of the plate. Volumes of 0.5-1.0 μl of the bile samples were applied directly to the plate. The plate was then placed in a chromatographic chamber previously saturated with the solvent system isooctane-isopropyl alcohol-ethyl acetate-acetic acid (40:20:10:19, v/v) at room temperature. After the center of the solvent front reached the 13-cm mark, the plate was taken out of the chamber and dried with cold air for 2 to 3 min. The plate was next placed in a second chamber and developed with the solvent system chloroform-methanol-water (65:35:4, v/v) up to the 6-cm mark and taken out of the chamber. Bile samples from gallstone patients and pure bile acids, conjugated and unconjugated, cholesterol, lysolecithin, and lecithin were examined by this method. Whatever might be the difference of R_F values, the compounds tested can be identified by their characteristic colors. The blue phospholipid color and the pink cholesterol color appear within 5-7 min of heating in the oven; the other bile acid colors appeared after that. All the colors stand out clearly in an almost white background. Lysolecithin and lecithin are blue; taurocholic acid, taurodeoxycholic acid, glycocholic acid, and glycodeoxycholic acid are greyish green; taurochenodeoxycholic acid, glycochenodeoxycholic acid, and chenodeoxycholic acid are purple; cholic acid is greenish yellow; deoxycholic acid is yellow; lithocholic acid is light purple; and cholesterol is pink and turns greenish grey.

3479 EFFECT OF ETHANOL ON FATTY ACID OXIDATION IN THE PERFUSED LIVERS OF STARVED, FED, AND FAT-FED RATS.

(E.) Fellenius, E.; Kiessling, K. H. (Inst. Zoophysiol., Univ. Uppsala, Sweden). *Acta Chem. Scand.* 27(8):2781-2790, 1973.

On the basis of measurements of oxygen uptake, ethanol and oleate removal, and the production of ketone-bodies and acetate by the perfused liver, the effect of ethanol (10 mM) on the flow through the citric acid cycle and the β-oxidation pathways was calculated. Studies were carried out with livers from fed, 48-hr starved, and fat-fed female Wistar rats. The high fat diet consisted of 90 parts margarine and 10 parts casein, and was supplemented with salts and vitamins. Ethanol depressed flow through the citric acid cycle by 40 to 60% depending on the nutritional state of the rat. The addition of pyruvate partly overcame this inhibition. The pathway of β-oxidation was also blocked by the addition of ethanol although, except for the fat-fed rats, ketone-body production was unaltered. The results suggest that if inhibition of the citric acid cycle by ethanol favors an accelerated rate of ketogenesis, this effect may be concealed by a block in β-oxidation which limits the supply of acetyl-coenzyme A for ketone-body formation. Ethanol did not stimulate triglyceride synthesis in livers from animals on a high-fat diet, while the β-oxidation pathway was greatly inhibited. The fraction of fatty acid undergoing esterification depends primarily on the level of α-glycerophosphate.

3480 EFFECT OF DIETARY 1,3-BUTANEDIOL ON IN VITRO FATTY ACID SYNTHESIS AND MALIC ENZYME ACTIVITY IN RAT LIVER AND ADIPOSE TISSUE.

(E.) Romsos, D. R.; Sasse, C.; Leveille, G. A. (Dept. Animal Sci., Univ. Illinois, Urbana). *J. Nutr.* 104(2):202-209, 1974.

Diets containing graded levels of 1,3-butanediol (BD) substituted for approximately equal amounts of glucose energy were fed to male, Sprague-Dawley rats. Body weight gain was not affected by addition of 10 parts (17% of dietary energy) BD to the diet; however, addition of 15 parts BD (25% of dietary energy) or more did depress weight gain. Plasma β-hydroxybutyrate and acetoacetate levels were elevated as dietary BD was increased. Increasing the BD content of the diet decreased plasma glucose, insulin, and triglyceride levels. Plasma free fatty acids were increased by addition of BD to the diet. Hematocrit was increased slightly in rats fed the BD-containing diets and may have been related to the increased rate of urination associated with elevated plasma ketones. Hepatic rates of *in vitro* fatty acid synthesis were markedly depressed when BD was added to the diet. The *in vitro* rates of fatty acid synthesis in adipose tissue were not affected by dietary BD. Malic enzyme activity was depressed in both liver and adipose tissue only when high levels of BD were added to the diets. It is suggested that dietary BD affects hepatic fatty acid synthesis in the rat by its effect on the hepatic reduced nicotinamide adenine dinucleotide/nicotinamide adenine dinucleotide ratio.

3481 HEPATIC ERYTHROPOIETIN PRODUCTION IN THE LEAD-POISONED RAT.

(E.) Schooley, J. C.; Mahlmann, L. J. (Lawrence Radiat. Lab., Univ. California, Berkeley). *Blood* 43(3):425-428, 1974.

Extrarenal erythropoietin production was studied in lead-injected male Sprague-Dawley rats exposed to hypoxia (5 hr at 22,000 ft) immediately after or 1 day after nephrectomy. Total erythropoietin production, as a result of hypoxic exposure, was not altered when lead (40 mg/kg i.v.) was injected 1 day before the 5-hr exposure. The production of the hormone by rats exposed to hypoxia immediately after nephrectomy was 4.5 times greater than in rats injected with lead 1 day before nephrectomy. Lead injection without a hypoxic exposure did not increase the serum erythropoietin level. The production of erythropoietin in the lead-injected anephric rats was almost completely prevented by partial hepatectomy or injection of actinomycin D (0.5 μg/g i.v.). Serum erythropoietin levels were not elevated in anephric hepectomized rats when the hypoxic exposure was increased to 28,000 ft or when the rats were bled (1.5 ml/100 g) before exposure to 22,000 ft. The increased extrarenal erythropoietin production in lead-poisoned animals suggests that processes involved in biogenesis of the hormone are increased above normal in the liver to compensate for the kidney dysfunction. Similar changes in the site of production or activation of the hormone may occur in renal disease.

3482 DEVELOPMENTAL CHANGES IN STEROL BIOSYNTHESIS FROM ACETATE AND MEVALONATE IN RAT LIVER.

(E.) Wrobel, J.; Boguslawski, W.; Michalska, L.; Niemiro, R. (Med Sch., Gdansk, Poland). *Int. J. Biochem.* 4(24):565-568, 1973.

Sterologenesis in the developing rat liver was investigated both *in vivo* and *in vitro* in Wistar albino rats of both sexes. For liver sterol synthesis *in vivo*, rats were given (I-^{14}C)acetate (1.0 μc/g) with (2^{-3}H)mevalonate (0.5 μc/g) in 0.9% NaCl by i.p. injection. Fetuses were kept alive in a thermostat set at 37 C while carrying out the experiment. Exactly 2 hr later the rats were killed and their livers were quickly removed. For liver sterol synthesis *in vitro*, the livers from at least 5 litter-mate rats were routinely pooled. Liver tissue was incubated at 37 C for 2 hr with 3.0 μc (I^{-14}C)-acetate and 0.9 μc. (2^{-3}H)mevalonate in 1.0 ml of Krebs-Ringer phosphate buffer, pH 7.4. There was a higher incorporation of (I^{-14}C)acetate into sterols in the 19-day fetus. This incorporation rose at birth, decreased sharply in the 2-day-old animal, and remained low between days 2-18 of postnatal life. There was a sharp increase in the incorporation of (I^{-14}C)acetate in the 22-day-old rat and the level was maintained in the 1-month-old-rat. The incor-

ation of $(2^{-3}H)$mevalonate into liver sterols was
h both in the 19-day-old fetus and in the 1-day-
rat, decreased 3-fold in the 2-day-old animal
remained essentially on the same constant level
ween days 5-30 of postnatal life. The effect of
on liver sterologenesis was similar *in vitro*.
the 2 to 18-day-old rat, the incorporation of $(I^{-14}C)$-
tate into digitonin-precipitable sterols was about
times lower than in the 19-day-old fetus and in
24 to 31-day rat. The incorporation of $(2^{-3}H)$me-
onate into digitonin-precipitable sterols was
entially constant between days 2-31 of postnatal
e. The incorporation of $(2^{-3}H)$mevalonate in the
-day-old fetus was about 2 times higher than in
2-day-old rat and in older animals. It is con-
ded that the rate of liver sterologenesis differs
kedly during pre- and postnatal development.
o, the developmental pattern of acetate incorpor-
ion into sterols is different from that of meva-
ate.

33 THE INFLUENCE OF ETHANOL-INDUCED CHANGES OF THE α-GLYCEROPHOSPHATE LEVEL ON HEPATIC
GLYCERIDE SYNTHESIS.

(E.) Fellenius, E.; Bengts-
, G.; Kiessling, K. H. (Inst. Zoophysiol., Univ.
sala, Sweden). *Acta Chem. Scand.* 27(8):2893-
1, 1973.

correlation between the level of α-glycerophos-
te and hepatic triglyceride synthesis was studied
livers from female Wistar rats. Livers were
fused *in situ* with and without oleate (2 mM) in
medium and the hepatic content of α-glycerophos-
te was varied by using livers of rats in differ-
nutritional states and by adding ethanol (10 mM),
uvate (1.93 M) or glycerol (0.33 M) to the perfu-
e. Changes in triglycerides were not a function of
concentration of α-glycerophosphate in the ab-
ce of oleate. In the presence of oleate, alone or
h other substrates, a correlation could be ob-
ved. Pyruvate tended to inhibit the ethanol-
uced increase of α-glycerophosphate and malate.
ate also decreased the ethanol-induced accumula-
n of α-glycerophosphate in the livers of starved
s but not in those of rats on normal diet. The im-
tance of the availability of proton acceptors for
regulation of the level of α-glycerophosphate is
cussed. The level of α-glycerophosphate may in-
ence net triglyceride synthesis. Factors that in-
ence the concentration of α-glycerophosphate may
the flux of α-glycerophosphate into mitochondria,
supply from glycolysis, gluconeogenesis, lipid
abolism, the pentophosphate pathway, the kinetic
avior of α-glycerophosphate dehydrogenase, the
take of glycerol from the blood, and finally the
ox state, or the availability of different proton
ceptors. Information on the interrelation between
glycerophosphate, malate, and lactate is of impor-
ce for a knowledge of the role of the availability
proton acceptors. It is possible that the β-hy-
oxybutyrate dehydrogenase is more important than
malate dehydrogenase for the reoxidation of
glycerophosphate under the present experimental
nditions. The capacity of the isolated liver
tochondria of rats fed a high-fat diet to oxidize
glycerophosphate was twice as great as that of
liver mitochondria of rats on a normal diet.
The result indicates a relation between lipid metabolism and the activity of the mitochondrial α-glycerophosphate dehydrogenase.

3484 REDUCTION OF ACUTE ALCOHOLIC INTOXICATION BY α AMINO ACIDS: GLYCINE AND SERINE.

(E.) Blum, K.; Wallace, J. E.; Friedman, R. N. (Univ. Texas Med. Sch., San Antonio). *Life Sci.* 14(3):557-565, 1974.

The ability of glycine and of serine to protect Sprague-Dawley rats from ethanol induced motor impairment was determined by pretreating the animals with these drugs (20.0 mM/kg p.o.), administering ethanol (108.7 mM/kg) 30 min later, and evaluating performance on a rotor-rod test at 30 min and 2 hr post-ethanol. Performance of the glycine and serine-pretreated rats was significantly superior to that of controls at the 30-min post-ethanol trial but not at the 2-hr trial. Blood-alcohol levels measured at the times of the trials corresponded with the behavioral performance. The levels were significantly depressed during the 30-min post-ethanol trials for both the glycine- and serine-pretreated groups. These findings provide evidence that glycine- and serine-induced protection against the described motor impairments caused by ethanol may be due to a suppression of the rate of absorption of ethanol from the gastrointestinal tract.

3485 GLUCAGON STIMULATION OF HEPATIC GLUCONEOGENESIS IN RATS FED A HIGH-PROTEIN, CARBOHYDRATE-FREE DIET.

(E.) Eisenstein, A. B.; Strack, I.; Steiner, A. (Brooklyn-Cumberland Med. Ctr., N.Y.). *Metabolism* 23(1):15-23, 1974.

The effects of glucagon (1 μg), dibutyryl cyclic AMP (DB-CAMP, $10^{-5}M$), and insulin (1U) on hepatic gluconeogenesis were examined in rats fed either a control diet, or a diet high in protein with no carbohydrates (HP). In perfused liver of control male Holzman rats, alanine conversion to carbohydrate amounted to 20.39 μmole/100 g/90min. Gluconeogenesis was increased to 35.14 by glucagon; to 31.40 by DB-CAMP, and suppressed to 14.56 by insulin. When both glucagon and insulin were added to the medium, only the stimulatory action of glucagon was evident. In perfused liver of HP-fed rats, alanine incorporation into carbohydrate totalled 51.79. Gluconeogenesis was elevated by glucagon to 65.23, by DB-CAMP to 62.27, and was unaffected by insulin, 49.73. In the presence of both glucagon and insulin, only the glucagon effect was apparent. Alanine, lactate, and pyruvate concentrations were reduced in HP liver, while phosphoenolpyruvate (PEP) was increased, findings that suggest enhanced conversion of pyruvate to PEP. Fructose diphosphate concentration was normal but fructose-6-phosphate was greatly elevated. Similar changes in hepatic metabolites have been found following exposure of normal liver to glucagon. Plasma insulin values were not altered by HP feeding. Plasma-glucagon levels were higher in HP rats than in controls. When the molar ratio of insulin to glucagon in plasma was calculated, the value in HP-fed rats was reduced. Liver cyclic AMP was greater in HP-fed rats than in controls, a finding that indicates that the liver was exposed to an increased amount of glucagon. It is concluded that increased glucagon secretion is responsible for the enhanced hepatic gluconeogenesis which occurs in HP-fed rats.

3486 BIOSYNTHESIS OF PROTEINS WHICH APPEAR IN RAT SERUM DURING LIVER REGENERATION.

(Ukr.) Polishchuk, A. S.; Danko, I. M.; Korotkoruchko, V. P.; Bogdan, I. P. (O. V. Palladin Inst. Biochem., Kiev, USSR). *Ukr. Biokhim. Zh.* 45(5):559-564, 1973.

The composition of serum proteins was investigated and the rates at which various protein fractions incorporated ^{14}C-1-glycine were measured in male rats 24 hr after partial hepatectomy performed by the method of Higgins and Anderson. Serum proteins were separated by elution from DEAE-Sephadex A-50 columns and were identified as α-, β-, and γ-globulin and albumin by their electrophoretic mobilities. During liver regeneration the rate at which serum γ- and α-globulin incorporated ^{14}C-1-glycine was 63% and 27%, resp., greater than the corresponding serum protein fractions from intact controls. The β-globulin and albumin fractions from hepatectomized rats incorporated this labeled amino acid more slowly than the corresponding serum protein fractions from controls. Investigations of ^{14}C-1-glycine incorporation into subfractions of γ- and α-globulins, obtained by step-wise elution from columns of DEAE-cellulose, showed that protein synthesis occurred most rapidly in subfractions which gave a positive (unspecified) precipitation reaction. These findings also suggest that liver regeneration is accompanied by rapid synthesis of serum proteins which are characteristic for this state.

3487 THE CHOLERETIC ACTION OF ETHACRYNIC ACID IN THE RAT.

(Ger.) Czok, G.; Schulze, P. J. (Pharmacol. Inst., Univ. Hamburg, Germany). *Arzneim. Forsch.* 23(12):1712-1716, 1973.

The relation between the extent and duration of increased bile flow and the dose of ethacrynic acid was established and the composition of bile obtained after administration of this agent was determined. When placed in the lower part of the duodenum through a catheter, 25, 50, 100, and 200 mg/kg of ethacrynic acid increased the bile output of male urethan-anesthetized Wistar rats by 25%, 64%, 114%, and 164%, resp. Cholestasis, which was usually fatal, occurred 2 hr after administration of 200 mg/kg. The maximum increase in bile flow, which occurred 1 hr after administration of ethacrynic acid, was accompanied by an increase in dry weight and K$^+$ concentration while the NA$^+$ and Cl$^-$ concentrations remained essentially unchanged. Although the amount of bile salts was increased, their concentration was decreased at this time. One hr after intraduodenal administration of ^{3}H-labeled ethacrynic acid, 26.44% had been excreted in the bile and 5 hr later 37.56% had been excreted. After 5 hr 7.09% of the activity was found in the urine and 18.5% was excreted from the gastrointestinal tract. In addition to unchanged ethacrynic acid, 3 metabolites were found in the bile during the first hr after its administration. Only one metabolite, which was not present in the bile, was detected in the urine. Since a large percentage of ethacrynic acid is excreted in the bile, it is suggested that this agent causes osmotic choleresis. The increased K$^+$ concentration of the bile is explained by the loss of this electrolyte from the cells due to the specific action of ethacrynic acid on the cell.

3488 AMYLASE ACTIVITY OF THE BILE AND LIVER IN ANIMALS AFTER RESECTION OF THE SMALL INTESTINE.

(Rus.) Talanina, L. Kh.; Kadyrov, M. Kh. (Tashkent Med. Inst., USSR). *Fiziol. Zh. SSSR* 59(11):1753-1756, 1973.

Amylase activity was measured in gallbladder bile from dogs and in liver homogenates from rats before and at various periods after resection of the proximal or distal half of the small intestine. Significant increases occurred in bile secretion and total amylase activity of bile from dogs which had undergone resection of the small intestine. This increase was more pronounced and lasted for a longer time when the distal half of the small intestine was resected. After resection of the proximal half of the small intestine of rats, amylase activity in liver homogenates increased less but the increase lasted for a longer period than when the distal half of the small intestine was resected. These findings and literature data suggest that increases in the amylase activity of the bile and liver after resection of parts of the small intestine are associated with disturbances in metabolic processes in the body and indicate that changes have occurred in liver function.

3489 EFFECT OF STARVATION ON THE QUANTITATIVE CELL STRUCTURE OF RAT LIVER CELLS. II. CHRONIC PARTIAL STARVATION.

(Ger.) Riede, U. N.; Hodel, J.; Matt, C. V.; Rasser, Y.; Rohr, H. P. (Inst. Pathol., Univ. Basel, Switzerland). *Beitr. Pathol.* 150(3):246-260, 1973.

A quantitative morphological analysis was made of cells in the hepatic parenchyma of 3 male Fischer rats given only 1 g/day of Altromin-R standard diet for 6 weeks and of 3 controls. Chronic partial starvation decreased the volume of single hepatocytes by 50% and doubled the volume percent of the nucleus per cell without any change occurring in the volume of single nuclei. A 75% decrease occurred in the number of mitochondria, while the mitochondrial volume increased 4-fold and the volume percent of mitochondria per cell doubled. The area of the cristae in each cell decreased by 1/3 and the volume of the mitochondrion decreased by 1/2. The number of microbodies per cell decreased by 40%, while no change occurred in the microbody volume. A 50% decrease occurred in the volume percent of the rough endoplasmic reticulum per unit volume hepatocyte, while the membrane area of the rough and smooth endoplasmic reticula per hepatocyte decreased by 1/3. No appreciable changes occurred in the volume percent of lysosomes or the volume percent of the Golgi apparatus per cell. The formation of megamitochondria, which contained large amounts of matrix and small areas of cristae,

icates that the chondriome had undergone functional
rganization during chronic partial starvation.
s is probably due to fusion of mitochondria. Great
reases in the areas of both rough and smooth
oplasmic reticula indicate that both synthetically
metabolically active cell compartments were
uced to a functioning minimum. Because of this,
production of new microbodies from the rough en-
lasmic reticulum was inhibited so that a decrease
urred in the number of microbodies per hepatocyte.

0 DEVELOPMENTAL CHANGES IN MOUSE LIVER ALCOHOL DEHYDROGENASE. *(E.)* Krasner, J.;
ksson, M.; Yaffe, S. J. (Sch. Med., State Univ.
York, Buffalo). *Biochem. Pharmacol.* 23(3):519-
, 1974.

kinetic parameters and electrophoretic properties
adult and newborn mouse alcohol dehydrogenase were
died in Cobbs Swiss-Webster mice (Charles River).
ohol dehydrogenase activity, at varying ethanol
centrations, in the supernatant fraction of liver
ogenates was determined by recording the genera-
n of reduced nicotinamide adenine dinucleotide
340 nm. The alcohol dehydrogenase activity was
er in the newborn than in the adult mouse. The
ctrophoretic pattern of adult and newborn mouse
ohol dehydrogenase showed migration toward the cath-
. This electrophoretic pattern is only seen when
shly prepared homogenate is used; when the homogen-
is stored frozen overnight, this electrophoretic
tern is not seen. A control without added alco-
showed very little activity even after a pro-
ged incubation. Residual alcohol in the Cellogel
brane may have been responsible for the appearance
this slight activity.

1 ULTRAMICROSCOPIC STUDY OF THE BILE LIPOPROTEIN COMPLEX. *(E.)* Nalbone, G.;
ont, H.; Domingo, N.; Lairon, D.; Pautrat, G.;
ton, J. (Res. Unit. Digestive Pathol., I.N.S.E.R.M.,
seille, France). *Biochimie* 55(11-12):1503-1506,
3.

ctron microscopy data are presented that dis-
minate between mixed micelles and bile lipids and
vide an additional argument in favor of the lipo-
tein nature of the lipid associations in bile.
an gallbladder bile samples are obtained by pre-
rative puncture, while samples of sheep's gall-
dder bile are taken immediately after the animal
been sacrificed. Gel filtration is carried out
room temperature. Lecithins, total bile salts,
cholesterol are measured in the samples and the
ctions collected after gel filtration. The nega-
e staining technique is used on the native sam-
s of bile and synthetic micelles, as well as on the
l of collected lecithin-containing fractions. As
ule, it is not possible to detect any structure
direct examination of native samples of bile and
thetic mixed micelles. The images obtained from
h synthetic micelles and bile do not represent
native state of organization and identity of bile
synthetic micelles cannot be established on the
is of the images seen. Gel filtration, disso-
ting the bile salts from the lecithins and cholesterol, thus makes it possible to eliminate the artefacts due to detergents on negative staining. On gel filtration in the presence of NaCl, the lecithins and cholesterol in the synthetic mixed micelles are eluted with the first void volume; the bile salts, totally dissociated from the lecithins, are eluted with 2.5 Vo. The elution volume of the lecithins, cholesterol and bile salts in the samples of bile are identical with those for the synthetic mixed micelles. The bile pigments are eluted in the same fractions as bile salts. The polypeptide fraction is found only in the fraction containing the bile lecithins. The addition of albumin in a final concentration of 5 g/liter to the synthetic mixed micelles alters the elution pattern of lecithins, 60% being eluted with the first void volume and the remaining 40% at 2 Vo, at the same time as albumin. Bile salts are eluted with 2.5 Vo.

3492 RELATIONSHIP OF SERUM TRIGLYCERIDE LOWERING TO CHANGES IN HEPATIC COMPOSITION INDUCED BY DIFFERENT CLASSES OF DRUGS. *(E.)* Dalton, C.; Hope, W. C.; Hope, H. R.; Sheppard, H. (Hoffmann-La Roche, Inc., Nutley, N.J.). *Biochem. Pharmacol.* 23(3):685-696, 1974.

Dose-related serum triglyceride lowering has been demonstrated in the male albino rat with the microsomal enzyme inducers phenobarbital, 5,5'-diphenyl-2-thiohydantoin, and chlorcyclizine (50 mg/kg/day for 9 days, p.o.) and with the clinically tested anti-hyperlipidemic agents clofibrate (250 mg/kg/day for 9 days) 1-methyl-4-pi-peridyl bis(*p*-chlorophenoxy) acetate, and 2-methyl-2-[*p*-(1,2,3,4-tetrahydro-1-naphthyl)-phenoxy] propionic acid (50 mg/kg/day for 9 days). With both classes of drugs, serum lipid lowering was accompanied by hepatomegaly due to an increase in liver protein and phospholipid. Hepatomegaly was reversible upon cessation of drug treatment. The anti-hyperlipidemic drugs caused an increase in microsomal *N*-demethylase activity but this was slight when compared with the induction produced by known microsomal enzyme inducers. Examination of the subcellular compartments indicated that even though both mitochondrial protein and phospholipid were increased with all the agents studied, the dominant change in the case of the microsomal enzyme inducers was in the microsomal compartment, whereas the anti-hyperlipidemic agents induced a larger increase in the mitochondrial fraction. The total accumulation of new membrane material, however, was similar for both classes of drugs. These data demonstrate that 2 classes of drugs which produce hepatomegaly through a proliferation of intracellular membranes also lower serum triglyceride levels.

3493 STUDY OF THE UPTAKE AND OUTPUT OF MACROMOLECULES IN THE ISOLATED RAT LIVER: RELATION TO PERFUSION CONDITIONS. *(Ger.)* Jahn, W.; Lengsfeld, A. (Max Planck Inst. Med. Res., Heidelberg, Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 281(2):241-256, 1974.

When livers from fed male Wistar rats were perfused with a fluid containing albumin or dextran, many vacuoles appeared in parenchymal cells 5-60 sec after the posthepatic pressure had been increased to 10 cm H_2O. These vacuoles first appeared on the sinusoidal side of the parenchymal cells, and some opened into Disse's spaces. Most cell structures remained intact, but a large decrease occurred in the number of microvilli. Within 50-60 min after circulation was normalized, the number of vacuoles had decreased and the number of microvilli had increased. When albumin was present in the perfusion fluid, vacuoles were filled with flocculent material, but when dextran was added, little or no electron-dense material was found in the vacuoles. Membranous structures were occasionally present in vacuoles produced by either dextran or albumin. Qualitatively similar reactions occurred when congestion was induced in the liver by blocking both ends of the vena cava for 5 min while perfusing at constant pressure (20 cm H_2O). The liver first took up water from the perfusion fluid and, after 50 min, released it. This process was associated with spontaneously reversible release of potassium from the liver. Measurements made with ^3H-dextran in the perfusion fluid revealed that the intracellular space had increased by 52 ± 8 µl/g and the dextran content by about 200 µl/g perfusion fluid after 50 min of congestion. When congestion was produced in the liver by increasing the posthepatic pressure, about half of the accumulated dextran was released within 5-10 min; much less albumin was released under these conditions. Both the uptake and release of dextran by the liver were greatly reduced by decreasing the temperature of the perfusion fluid to 8-10 C. These findings suggest that stasis in the hepatic circulation results in endocytotic uptake of perfusion fluid. A subsequent release of water increases the concentration of macromolecular substances inside the vacuoles. The decrease in the number of microvilli which occurred during stasis suggests that the membrane surfaces of these microvilli take part in the formation of endocytotic vacuoles.

3494 THE METABOLISM OF PHOSPHORIC ESTERS AND OF CYTIDINE-DIPHOSPHATE ESTERS OF CHOLINE AND ETHANOLAMINE IN THE LIVER. *(E.)* Binaglia, L.; Roberti, R.; Michal, G.; Porcellati, G. (Univ. Perugia, Italy). *Int. J. Biochem.* 4(24):597-611, 1973.

The labelled phosphate and cytidine-diphosphate esters of choline (CDP) and ethanolamine, together with their bases, were incubated with liver homogenate and microsomal membranes from female Wistar rats, and the transfer of radioactivity into water-soluble and lipid components examined. Very small amounts of phosphorylcholine are produced from choline *in vitro*; this contrasts with the considerable labelling *in vivo* of the liver phosphorylcholine from administered choline. Higher conversion of choline or phosphorylcholine is displayed by the microsomes supplemented by their supernatant, and this result points to the participation of these 2 fractions in the phosphorylating reaction. The conversion of phosphorylcholine to choline occurs in the microsomes to a considerable extent, and this points to the importance of this last fraction for the hydrolysis of soluble components. CDP-choline is strongly hydrolyzed back to phosphorylcholine, even in the absence of supernatant protein. Noticeable conversion of CDP-choline to lipid takes place. Choline is weakly converted into phosphorylcholine by either homogenate or microsomes, being almost totally recovered as intact molecules *in vitro* after 1 hour of incubation, and with slight conversion into betaine. Minimal but significant amounts of radioactivity are transferred into lipid material, and only trace amounts of CDP-choline are detectable. Phosphorylcholine is hydrolyzed back to choline by about 5% of the incubated amount after 1 hour. About 53% of CDP-choline is recovered as intact molecule in liver homogenate after 1 hour of incubation. The percentage of radioactivity of the incubated CDP-choline found in the free choline is of the order of 1.2 (homogenate) or 0.8 (microsomes). Very small conversion of ethanolamine to phosphorylethanolamine occurs in the liver homogenate and microsomes, smaller than that observed during conversion of choline to phosphorylcholine. Conversion of phosphorylethanolamine to ethanolamine takes place at a higher specific activity in the microsomal membranes as compared to homogenate. Lecithin is formed upon incubation with CDP-ethanolamine. Choline, phosphorylcholine, ethanolamine, and phosphorylethanolamine are barely utilized by liver preparations *in vitro*. Very small amounts of phospholipids are formed *in vitro* from these precursors, which in addition are recovered as intact molecules to a noticeable extent or transformed to a slight degree into other water-soluble components. Owing to the findings presented in this work, the question therefore arises whether choline and ethanolamine are the actual forms of metabolites which are utilized by the liver cell *in vivo* after their administration or whether they are quickly transformed into some more reactive molecules, which are successively transported to sites of utilization.

3495 HEPATIC MICROSOMAL MEMBRANE: ACTIVATION OF GLUCOSE-6-PHOSPHATASE. *(E.)* Carvo, M M.; Maddaiah, V. T.; Collipp, P. J.; Chen, S. Y. (Nassau Cty. Med. Ctr., East Meadow, N.Y.). *FEBS Lett.* 39(1):102-104, 1974.

The mechanism by which NH_4OH increases the activity of liver glucose-6-phosphatase *in vitro* was studied using lyophilized rat microsomes inactivated by pyr-idoxal-5'-phosphate (PLP). In microsomal preparations inactivated 8.5% by PLP, the percent activation by NH_4OH was 28. When percent inactivation by PLP was 40-50, the percent activation by NH_4OH was 36.6 to 52.7. Since the percent activation by NH_4OH was only 38.6 at 62% inactivation, some inactivation of unexposed or latent enzyme molecules may occur at higher PLP concentrations. Following treatment of the microsomal suspension with NH_4OH and subsequent centrifugation, about 90% of the enzymatic activity appeared in the supernatant; without NH_4OH treatment only 10% of the enzymatic activity appeared in the supernatant. The integrity of the microsomal membrane structure was retained after NH_4OH treatment. The data are consistent with the hypothesis that liver endoplasmic reticulum contains 2 kinds of glucose-6-phosphatase active sites. The readily accessible sites can be

ctivated by PLP, while NH_4OH can expose the
s accessible sites.

6 THE ROLE OF BILE SALTS IN THE HEPATIC EXCRETION OF IOPANOIC ACID.

(E.) Berk,
N.; Goldberger, L. E.; Loeb, P. M. (Univ. Cali-
nia, San Diego, Sch. Med., La Jolla). *Investi-*
ive Radiol. 9(1):7-15, 1974.

anoic acid excretion in the bile of dogs was
died during choleresis produced by B(2-4 di-
hoxy-5-cyclohexylbenzoyl) propionic acid (SC2644)
compound which stimulates bile-salt independent
alicular bile flow), sodium dehydrocholate (a
e-salt which increases bile-salt dependent bile
w but does not form micelles), and sodium tauro-
late (a micelle-forming bile salt choleretic).
eriments were performed in anesthetized and un-
sthetized dogs whose common ducts were catheter-
d immediately prior to the experiment, and in
anesthetized dogs prepared months earlier with a
mas cannula inserted into the duodenum. The
unt of iopanoic acid rose in proportion to the
rease in bile flow stimulated by dehydrocholate
taurocholate; the total excretion remained un-
nged by SC2644 choleresis. The failure of SC2644
increase the excretion of iopanoic acid despite
increase in bile flow indicates that the canali-
ar bile flow *per se* is not the important deter-
ant in regulating iopanoic acid excretion. Be-
se bile salts stimulated iopanoic acid excretion,
is the bile salts themselves and not the in-
ase in bile flow that influence iopanoic acid.
ce there was no difference in the effects of de-
rocholate and taurocholate, it is not the micellar
perty of the bile salts which enables these com-
nds to increase the rate of iopanoic acid excre-
n. There may be an allosteric interaction be-
en the bile salts and the carrier for iopanoic
d in the canalicular membrane which facilitates
transport of iopanoic acid from the hepatocyte
o the bile.

7 EFFECT OF SPIRONOLACTONE ON DRUG-METABOLIZING ENZYMES IN THE ENDOPLASMIC RETICULUM THE HUMAN AND RAT LIVER.

(Ger.) Leber, H. W.;
ders, P.; Schutterle, G. (Med. Clin., Univ.
ssen, Germany). *Verh. Dtsch. Ges. Inn. Med.*
1358-1362, 1972.

ce experimental studies have shown that large
es of spironolactone increase the rate at which
nopyrine is metabolized in rats by stimulating
ed-function oxidation in the liver, studies were
formed on human subjects with normal kidney and
er function to determine whether therapeutic
es of spironolactone have the same effect in man.
inistration of spironolactone (7 mg/kg/day p.o.)
7 subjects for 14 days before injection of metham-
one (1 g i.v.) caused no appreciable change in
nary excretion of 4-aminoantipyrine or N-acetyl-
minoantipyrine. The plasma half-life of aminopy-
e (12 mg/kg p.o.) in 10 subjects who had received
ronolactone (400-600 mg p.o. or i.v. for 2 weeks
more) was 3.86 ± 1.46 hr, while that determined
10 untreated controls was 3.94 ± 1.69 hr. This difference is not significant. These findings indicate that spironolactone does not increase the rate at which aminopyrine is metabolized in the human liver.

3498 EFFECT OF NICOTINAMIDE ON CARBOHYDRATE METABOLISM IN THE RAT LIVER DURING STARVATION.

(E.) Talke, H.; Maier, K. P.; Kersten, M.; Gerok, W. (Dept. Int. Med., Univ. Freiburg, Germany). *Eur. J. Clin. Invest.* 3(6):467-474, 1973.

A single high dose of nicotinamide (500 mg/kg) results in an 8-hr inhibition of lipolysis in adipose tissue by transformation to nicotinic acid. The effect of inhibited lipolysis on carbohydrate and amino acid metabolism after 48 hr starvation was examined in male Sprague-Dawley rats. Within 2 hr after i.p. injection of nicotinamide, the plasma level of free fatty acids (FFA) declines from 900 to 300 μval/l. The FFA level rises again between 8-12 hr after injection. The reduced supply of FFA to the liver leads to a reduced oxidation rate, characterized by a fall in the acetyl-nicotinamide content of the liver and of ketone bodies in liver and blood. Simultaneously there is an increase in protein catabolism. This increase is characterized by increased urinary excretion of urea up to 10 hr after nicotinamide injection and by a higher urea production rate in liver slices of rats pretreated with nicotinamide. In the liver the levels of the following amino acids rise very sharply: serine (100%), citrulline (400%), ornithine (250%), alanine (300%), aminobutyric acid (470%), valine (350%), leucine (250%), isoleucine (370%). The content of threonine is reduced to 63% and glycine to 50%. The levels of aspartic acid, glutamic acid, tyrosine, lysine, histidine, and arginine are unchanged. The result of the increased precursor supply for gluconeogenesis is a higher rate of glucose production, characterized by a 40 mg/100 ml increase in blood glucose, by an increase in liver glycogen content, by an increase in the concentrations of intermediates of the Embden-Meyerhof-pathway, mainly the concentrations of phosphoenolpyruvate (870%), 3-phosphoglycerate (480%), D-fructose 1,6-diphosphate (150%), D-glucose-6-phosphate (250%), and glucose (220%). In liver slice experiments the glucose production rate from L-alanine rises significantly after pretreatment of the animals with nicotinamide. The results show that a stimulation of gluconeogenesis is obtainable *in vivo*, although the oxidation rate is not a primary condition of stimulated gluconeogenesis.

3499 QUANTITATIVE ANALYSIS OF THE BILE ACID PATTERN IN SUBCELLULAR FRACTIONS OF THE LIVER.

(Ger.) Wildgrube, H. J.; Leuschner, U.; Al-Fureyh, A. (Ctr. Intern. Med., Univ. Frankfurt/Main, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78: 1395-1400, 1972.

Quantitative determinations were made of the bile acid content and pattern in mitochondrial, microsomal, and cytoplasmic fractions from livers of normal male Wistar rats which had been fasted for 12 hr. While the cytoplasm showed only traces of cholanic acid and the mitochondrial fraction accounted for only 1/16 of the bile acid present (6-60 μg/g mitochondria), the highest bile acid content was found in the microsomal fraction (30-1300 μg/g microsomes). The bile acid patterns differed in the microsomal and mitochondrial fractions, but these patterns varied greatly and no characteristic distribution was demonstrated for either fraction.

3500 CHOLESTEROL SOLUBILITY IN MODEL BILE SYSTEMS: IMPLICATIONS IN CHOLELITHIASIS.

(E.) Mufson, D.; Triyanond, K.; Zarembo, J. E.; Ravin, L. J. (Smith Kline, Franch Labs., Philadelphia, Pa.). *J. Pharm. Sci.* 63(3):327-332, 1974.

The solubility of cholesterol in a physiologically realistic model bile system was studied as a function of its (crystalline) form. Significant behavioral differences in the rate of solution and the approach to equilibrium were noted. The solubility of the equilibrium species, hydrated cholesterol, and of fresh human gallstones was approximately 5 mole/100 ml. Anhydrous and coprecipitated cholesterol samples attained metastable solubility values. The lag time for nucleation and growth in these systems could account for lab-to-lab variations found in previous studies and could be of extreme importance *in vivo* when lithogenic bile is present. Solubility was also measured as a function of the bile salt-lecithin ratio. Evaluation of the data with respect to available clinical data indicates that many normal individuals have bile which is supersaturated with cholesterol. Supersaturation is maintained until enough solute molecules are present to spontaneously aggregate into a stable cluster on which crystal growth can proceed, or until a suitable catalyst is added which triggers crystal growth.

3501 EFFECT OF ETHANOL ON LIPOPROTEIN METABOLISM IN THE ISOLATED PERFUSED RAT LIVER.

(Ger.) Garba, U.; Papenberg, J. (Med. Clin., Univ. Heidelberg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78: 1630-1631, 1972.

The effect of ethanol (43.5 mM) on lipoprotein synthesis and secretion was studied in isolated perfused livers from nonfasted rats. The quantity of apoprotein synthesized by 10 g liver over a 3-hr period was measured by determining the specific activity of apoprotein, in cpm/μg apoprotein, into which uniformly labeled ^{14}C-L-leucine had been incorporated. Ethanol inhibited secretion of very high density lipoproteins (VHDL) but had little effect on the secretion of low density and high density lipoproteins. This was surprising since ethanol induces secondary hyperpre-β-lipoproteinemia in man. This difference must result from differences in hepatic metabolism *in vivo* and *in vitro*. There were small differences in the specific activities of the various lipoprotein fractions which might be due to ethanol-induced changes in apoprotein composition.

3502 ASSESSMENT OF LIVER REGENERATION IN THE RAT USING THE GAMMA CAMERA.

(E.) Karran, S. J.; Leach, K. G.; Blumgart, L. H. (Welsh Natl. Sch. Med., Cardiff). *J. Nucl. Med.* 15(1):10-16, 1974.

A new method for imaging the liver and other organs of small animals makes use of a pinhole collimator and a gamma camera. Radioisotopic scintigraphs of the rat liver were obtained before and at various intervals after partial hepatectomy using ^{99m}Tc-sulfur colloid and ^{75}Se-L-selenomethionine. The scintigraphs of the two compounds were similar in size and there was no obvious difference in their distribution within the liver, either before or after partial hepatectomy. A close correlation was found between the mean area of the lateral scintigraphs of the liver and liver weight, and a formula was derived whereby liver weight could be calculated from the size of the scintigraphs. Following 2/3 partial hepatectomy in the rat, the remnant regained its normal mass within 7-10 days. The results show the usefulness of ^{99m}Tc-sulfur colloid in the clinical assessment of posthepatectomy liver regeneration.

3503 NITROGEN METABOLISM IN THE ISOLATED PERFUSED RAT LIVER. NITROGEN BALANCE, REDOX STATE AND RATES OF METABOLISM.

(E.) Parrilla, R.; Goodman, M. N. (Harvard Med. Sch., Boston, Mass.). *Biochem. J.* 138:341-348, 1974.

Nitrogen balances were measured in the isolated perfused livers of male Sprague-Dawley rats in the presence and absence of nitrogen donors. In all instances, the balance appeared to be incomplete. The expression (alanine)(α-oxogluarate)/(pyruvate)(glutamate) remained fairly constant under the metabolic conditions studied, indicating that it may have been at near equilibrium. The extra nitrogen appeared to be derived from increased hepatic proteolysis. The addition of a nitrogen donor to the perfusate arrested proteolysis, as did the addition of pyruvate. The free mitochondrial (NAD+)/(NADH) ratio, calculated from the glutamate dehydrogenase and β-hydroxybutyrate dehydrogenase reactants, showed similar values and exhibited parallel changes under most metabolic situations studied. The data indicate that under these conditions both dehydrogenases share a common mitochondrial NAD pool. Glutamate dehydrogenase appears to play an important role in hepatic nitrogen metabolism *in vivo*.

3504 FURTHER STUDIES ON THE TIME COURSE OF REREPRESSION OF TWO RAT LIVER ENZYMES.

(E.) Szepesi, B.; Slayton, C. A.; Michaelis, IV, O. E. (Nutrition Inst., Agr. Res. Serv., Beltsville, Md.). *Proc. Soc Exp. Biol. Med.* 145(2):729-733, 1974.

The activities of glucose 6-phosphate dehydrogenase (G6PD), 6-phosphogluconate dehydrogenase (6PGD), and malic enzyme (ME) were rerepresses following feeding of a high-fat diet to starving male specific pathogen-free Wistar rats. When such a regimen was followed, a second episode of starvation-refeeding no longer caused "increased inducibility" of these enzymes. Treatment of the rats with 8-azaguanine (0.5 ml i.p.) during feeding of the high-fat diet prevented the

fect of the diet on G6PD inducibility, decreased
e effect on ME inducibility, and had very little
fect on 6PGD inducibility. The results indicate
at transcriptional rerepression required exogenous
t and *de novo* RNA synthesis, but that 6PGD can be
repressed without *de novo* RNA synthesis. The data
rther indicate that the *de novo* RNA synthesis
cessary for the rerepression of G6PD and ME occurs
ring the second day of refeeding and coincides
th the time course of *de novo* RNA synthesis re-
irement for the enzyme overshoot.

05 THE EFFECT OF BILIARY OBSTRUCTION ON SOME PROPERTIES OF ALKALINE PHOSPHATASE OF RAT
VER. *(E.)* Moss, D. W.; Panov, E. Y.; Whitaker,
B. (Roy. Postgrad. Med. Sch., London, England).
in. Chim. Acta 51(1):41-46, 1974.

kaline phosphatase was significantly more heat
able in extracts from livers of rats with occluded
le ducts than enzyme extracted from normal liver.
is increased heat stability in bile duct-ligated rats
s maintained and even enhanced with prolonged
liary obstruction although total and specific ac-
vities of the enzyme decreased from the maximum
lues. The heat stability, expressed as the per-
ntage of activity remaining after incubation for
min at 56 C, was 51.65% 10 days after bile duct
gation compared with 45.99% after 24 hr. The
tio of orthophosphatase to inorganic pyrophosphate
tivity was also significantly higher in liver ex-
acts from bile duct-ligated rats than in normal
ver extracts. This ratio increased from 9.33 in
rmal liver to 18.04 24 hr after bile duct ligation
d 16.42 10 days after bile duct ligation. No
fferences were detected in the electrophoretic
bility or in Michaelis constants for orthophosphate
drolysis. Starch gel electrophoresis demonstrated
at the higher enzyme activity in bile duct-ligated
ts resulted from an increase in the activity of
e major, pre-existing anodic phosphatase fraction.
similar changes occur in the properties of
patic alkaline phosphatase in biliary obstruction
man, they may account for some of the observed
riations in the heat stability of serum alkaline
osphatase in patients with apparently similar di-
ases and total serum phosphatase activities.

06 INCREASED CARBON TETRACHLORIDE HEPATOTOXICITY, AND ITS MECHANISM, AFTER CHRONIC ETHANOL
NSUMPTION. *(E.)* Hasumura, Y.; Teschke, R.; Lieber,
S. (Mt. Sinai Sch. Med., City Univ. New York, N.Y.).
stroenterology 66(3):415-422, 1974.

male Sprague-Dawley rats were pair fed a nutrition-
ly adequate liquid diet containing either ethanol
6% of total calories) or isocaloric carbohydrate
ontrols) for 4-5 weeks. Carbon tetrachloride (CCl_4)
s given intragastrically (0.5 ml/kg) 15 hr after
hanol withdrawal. In ethanol-fed rats, as compared
controls, significantly higher enzyme activities
re exhibited by serum ornithine carbamyl transferase
d glutamic pyruvic transaminase while the enzymes
patic aminopyrine N-demethylase and glucose-6-phos-
atase showed significantly lower activities. Con-
ntrations of liver lipid and serum bilirubin were
gnificantly higher but hepatic cytochrome P-450 content decreased significantly in the ethanol-treated rats. These findings indicate the *in vivo* potentiation of CCl_4 hepatotoxicity by chronic ethanol consumption, even in the absence of ethanol at the time of CCl_4 administration. For *in vitro* studies of the mechanism of ethanol-CCl_4 synergism, liver microsomes were incubated with CCl_4 and a reduced NADP-generating system. Results showed that CCl_4 destruction of cytochrome P-450 was much greater in microsomes of ethanol-treated rats. In addition, covalent binding of labeled CCl_4 metabolites to microsomal protein was increased and the enhancement of metabolism of $^{14}CCl_4$ to $^{14}CO_2$ in ethanol-fed rats was seen. Thus, it is suggested that the increase of CCl_4 hepatotoxicity in chronic ethanol fed rats is due to an enhanced microsomal activation and biotransformation of CCl_4.

3507 THE EFFECTS OF CERTAIN HYPOCHOLESTEROLEMIC AGENTS ON HEPATIC DELTA-AMINOLEVULINIC ACID SYNTHETASE LEVELS IN MICE.
(E.) Weissman, E. B.; Cheng, L. C.; Orten, J. M. (Buffalo Gen. Hosp., N.Y.). *Proc. Soc. Exp. Biol. Med.* 145(2): 438-441, 1974.

A study was made of the effects of *trans*-1,4-bis-(2 chlorobenzylaminomethyl)-cyclohexane dihydrochloride (3 mg/day for 3 days i.p.) and β-benzalbutyric acid (150 or 300 mg/kg/day for 4 days i.p.) on the activity of δ-aminolevulinic acid synthetase in the mitochondria of livers of white Swiss Webster mice injected with porphyrinogenic compounds. The porphyrinogenic agents were allylisopropylacetamide (6 mg s.c.) and 3,5-dicarbethoxy-1,4-dihydro-2,4,6-trimethylpyridine (6 mg s.c.). Both hypocholesterolemic agents prevented the usual induction of δ-aminolevulinic acid synthetase activity by porphyrinogenic agents. Administration of *trans*-1,4-bis-(2-chlorobenzylaminomethyl)-cyclohexane dihydrochloride also produced a consistent decrease (20%) in serum cholesterol levels. The data suggest that a decrease in the hepatic steroid pool and presumably that of 5β-H-steroid metabolites, as reflected by the serum cholesterol level, is associated with the observed decrease in hepatic mitochondrial δ-aminolevulinic acid synthetase. This study thus supports other evidence implicating steroid metabolites in the regulation of porphyrin-heme biosynthesis in a mammalian species.

3508 PROPERTIES OF RAT LIVER ALKALINE PHOSPHATASE BEFORE AND AFTER BILE DUCT LIGATION.
(E.) Righetti, A. B. B.; Kaplan, M. M. (New England Med. Ctr. Hosp., Boston, Mass.). *Proc. Soc. Exp. Biol. Med.* 145(2):726-728, 1974.

The properties of alkaline phosphatase were studied before and after "induction" by bile-duct ligation in male Charles River CD rats. Bile duct ligation caused a 5- to 10-fold increase in alkaline phosphatase activity. The enzyme in the bile duct-ligated rat liver was identical with the hepatic alkaline phosphatase from unoperated control rats in terms of electrophoretic mobility on polyacrylamide gel, rate of sedimentation in a sucrose gradient, rates of heat and urea denaturation, pH optima, and Michaelis constants. Since the 'induced' and base-level enzymes are identical by all criteria studied, it is unlikely that the increase in enzyme activity was due to activation of a preformed enzyme. Enzyme induction appears to be a more likely mechanism.

3509 EVIDENCE OF DEFECTIVE PROTEIN SYNTHESIS IN LIVER IN RATS WITH CONGENITAL HYPERBILIRUBINEMIA (GUNN). *(E.)* Majumdar, A. P. N.; Greenfield, S. (Inst. Med. Biochem., Univ. Aarhus, Denmark). *Biochim. Biophys. Acta* 335(2):260-263, 1974.

Liver slices from adult homozygous Gunn rats and normal rats were incubated with ^{14}C-leucine. The protein specific activity of all subcellular fractions prepared from Gunn liver homogenates was reduced by about 50% as compared with control values. In a second series of experiments, cell-free protein synthesis was studied using polyribosomes and dialyzed pH 5 enzyme fractions from homozygous and heterozygous Gunn and normal Wistar rat livers. Polyribosomes from homozygous rat livers incorporated 50% less ^{14}C-leucine than normal or heterozygous rat polyribosomes when incubated with homologous pH 5 enzyme fractions. In contrast, homozygous polyribosomes incubated with heterozygous or normal pH 5 enzyme fractions incorporated ^{14}C-leucine to the same extent as the other systems. Protein synthesis was also diminished in normal polyribosomes incubated with homozygous rat pH 5 enzyme fractions. The results indicated that the defect in protein synthesis in the adult homozygous Gunn rat is localized in the pH 5 enzyme fraction and not in the polyribosomes. The reduced *in vitro* protein synthesis in the homozygous Gunn rat is not due to higher ribonuclease activity in either the ribosomes or the pH 5 enzyme fraction. The data indicate bilirubin may be responsible for the lowering of protein synthesis in homozygous Gunn rats.

3510 EFFECTS ON CEREBRAL ENERGY STATE OF ARTERIAL HYPOTENSION IN RATS WITH PORTACAVAL ANASTOMOSIS. *(E.)* Holmin, T.; Johannsson, H.; Siesjo, B. K. (Univ. Hosp., Lund, Sweden). *Acta Physiol. Scand.* 90(2):345-357, 1974.

By bleeding the animals to mean arterial blood pressures of 45 and 30 mm Hg, the influence of arterial hypotension on the energy state of the brain was studied in male Wistar rats with end-to-side portacaval shunts. Reduction of blood pressure to 45 mm Hg in shunted rats produced no or only moderate accumulation of lactate, and there were no changes in the contents of ATP, ADP, and AMP in frontal lobe or brain stem. At a mean blood pressure of 30 mm Hg, shunted animals and controls showed similar values for glycolytic and citric acid cycle intermediates, amino acids, and adenine nucleotides in frontal lobe, parietal cortex, and brain stem. It is concluded that the portacaval shunt and the accompanying hyperammonemia did not adversely affect cerebral energy metabolism in any of the regions studied during hypotensive stress. Cerebral venous oxygen pressure was higher in shunted rats than in controls in these experiments. This finding is compatible with a decreased cerebral metabolic rate or with a relative increase in cerebral blood flow. Either factor may aid in protecting tissue against the metabolic effects of arterial hypotension.

3511 EFFECT OF DIETARY CHOLINE AND ETHANOL ON HEPATIC TRIGLYCERIDES AND ACTIVITY OF HEPATIC ETHANOL OXIDIZING ENZYMES IN RATS. *(E.)* Rifenbrick, D. H.; Narrod, S. A.; Myerson, R. M.; Scorpio, R. M. (Med. Coll. Pennsylvania, Philadelphia *Proc. Soc. Exp. Biol. Med.* 145(3):1061-1064, 1974.

Female CD rats were maintained for 21 days on a liquid diet with and without choline supplementation. Ethanol was given to half the rats as an isocaloric substitution for dietary sucrose. After 21 days, choline-deficient ethanol-fed rats had a mean liver triglyceride content significantly greater than that of choline-deficient controls. In contrast, choline-supplemented ethanol-fed rats had a mean liver triglyceride content not significantly different from choline-supplemented controls or rats fed laboratory chow. A significant increase in hepatic microsomal ethanol oxidizing system activity occurred only in choline-supplemented ethanol-fed rats. However, chronic ethanol administration did not increase hepatic alcohol dehydrogenase activity. The failure of microsomal ethanol oxidizing activity to increase in ethanol-fed choline-deficient rats could h resulted from a deficiency in phospholipid synthesis since increasing the choline content of the diet from 8 to 125 mg/100 ml resulted in significant stimulation. These results suggest that in rats choline not only protects against alcoholic fatty liver but also enhances stimulation of microsomal ethanol oxidizing activity induced by chronic ethanol feeding.

3512 MODERATE ETHANOL INGESTION AND PLASMA TRIGLYCERIDE LEVELS: A STUDY IN NORMAL AND HYPERTRIGLYCERIDEMIC PERSONS. *(E.)* Ginsberg, H.; Olefsky, J.; Farquhar, J. W.; Reaven, G. M. (Stanford Univ. Sch. Med., Calif.). *Ann. Intern. Med.* 80(2):143-149, 1974.

Plasma lipid, glucose, and insulin levels were measured in nonalcoholic normal subjects (4 men and 2 women; mean age, 28.5 yr) and hypertriglyceridemic subjects (6 men and 3 women; mean age, 44.8 yr) given moderate amounts of ethanol 3 times daily for 7 days. The subjects received 35 g ethanol with the noon meal, 35 g with dinner, and 17 g at bedtime. In the hypertriglyceridemic group, ethanol ingestion caused fasting plasma triglyceride levels to rise from a control value of 338 mg/100 ml to 498 mg/100 ml. There were no significant changes in the fasting plasma triglyceride levels of the 6 normal subjects. The postprandial triglyceride response to ethanol rose 37% in the normal group and 44% in the hypertriglyceridemic group. Fasting or postprandial glucose and insulin levels did not change during ethanol ingestion. The finding that moderate amount of alcohol can markedly exacerbate preexisting hypertriglyceridemia should be considered when treating patients with this disorder. Alcohol-induced hypertriglyceridemia can occur independently of any effect that alcohol might have on plasma glucose and insulin levels.

13 AN ENZYMATIC EXPLANATION FOR DIETARY INDUCED ALTERATIONS IN HEPATIC GLYCEROLIPID TABOLISM. *(E.)* Lamb, R. G.; Fallon, H. J. (Univ. rth Carolina Sch. Med., Chapel Hill). *Biochim. ophys. Acta* 348(1):179-188, 1974.

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16 DETERMINATION OF THE KINETIC CONSTANTS OF FRUCTOSE TRANSPORT AND PHOSPHORYLA-ON IN THE PERFUSED RAT LIVER. *(E.)* Sestoft, ; Fleron, P. (Dept. Biochem., Univ. Copenhagen, mark). *Biochim. Biophys. Acta* 345(1):27-38, 3.

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0 THE DEVELOPMENT OF BILIARY INFECTION, AN EXPERIMENTAL STUDY. *(E.)* Kune, G. A.; berd, J.; Morahan, R. (Roy. Melbourne Hosp., tralia). *Med. J. Aust.* 1(9):301-303, 1974.

1 HEPATIC IRON STORAGE CONCENTRATIONS IN THE INHABITANTS OF PAPUA NEW GUINEA. *(E.)* ler, P.; Charlton, R. W.; Bothwell, T. H.; iks, J. (Med. Sch., Johannesburg, South Africa). *Afr. J. Med. Sci.* 38(3/4):91-94, 1973.

2 DYNAMICS OF THE 24-HOUR RHYTHM OF MITOTIC ACTIVITY IN ACINOUS CELLS OF THE PANCREAS ER CONDITIONS OF DISTURBED INNERVATION. *(Rus.)* tsky, Y. K.; Lindenberg, L. K. (N. I. Pirogov . Inst., Moscow, USSR). *Biull. Eksp. Biol. Med.* 3):93-95, 1974.

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3524 THE EFFECTS OF VARYING IONIC COMPOSITION OF THE PERFUSATE ON LIVER MEMBRANE POTENTIAL, GLUCONEOGENESIS AND CYCLIC AMP RESPONSES. *(E.)* Dambach, G.; Freidmann, N. (Univ. Pennsylvania, Sch. Med., Philadelphia). *Biochim. Biophys. Acta* 332(3):374-386, 1974.

3525 EFFECTS OF AMINOOXYACETATE ON THE METABOLISM OF ISOLATED LIVER CELLS. *(E.)* Rognstad, R.; Clark, D. G. (Cedars Sinai Med. Ctr., Los Angeles, Calif.). *Arch. Biochem. Biophys.* 161(2):638-646, 1974.

3526 THE EFFECT OF VAGOTOMY ON BILIARY SECRETIONS AND BILE SALT POOLS IN DOGS. *(E.)* White, T. T.; Tournut, R. A.; Scharplatz, D.; Kavlie, H.; Olson, A. D.; Dopton, D. S. (Univ. Washington, Sch. Med., Seattle). *Ann. Surg.* 179(4):406-411, 1974.

3527 REGULATION OF SPLEEN GROWTH IN HEPATIC DYSFUNCTION. *(E.)* Dumont, A. E.; Becker, F. F.; Jacob, H. S. (New York Univ. Sch. Med., New York). *Ann. Surg.* 179(4):465-471, 1974.

3528 ON NON-SPECIFIC INHIBITION OF RAT LIVER MICROSOMAL UDP GLUCURONYLTRANSFERASE BY SOME DRUGS. *(E.)* Mulder, G. J. (Dept. Pharmacol., State Univ. Groningen, Netherlands). *Biochem. Pharmacol.* 23(8):1283-1291, 1974.

3529 LIVER REGENERATION IN THE PRESENCE OF VARIOUS HORMONES. *(E.)* Gershbein, L. L.; Machlin, L. J. (Northwest Inst. Med. Res., Chicago, Ill.). *Acta Hepatogastroenterol.* 20:463-466, 1973.

3530 EFFECTS OF COLECTOMY ON ENCEPHALOPATHY IN RATS WITH PORTACAVAL SHUNTS. *(E.)* Grange, D.; Chauvaud, S.; Thangapregassam, M. J.; Bismuth, H. (Paul Brousse Hosp., Villejuif, France). *Surg. Gynecol. Obstet.* 138(4):537-541, 1974.

3531 GLUCONEOGENESIS IN THE CIRRHOTIC LIVER OF THE RAT. THE EFFECT OF OLEATE OR ETHANOL. *(E.)* Henley, K. S.; Laughrey, E. G.; Clancy, P. E. (Univ. Michigan Med. Ctr., Ann Arbor). *J. Lab. Clin. Med.* 83(2):175-188, 1974.

3532 EFFECT OF 18 HR FAST AND GLUTATHIONE DEPLETION ON 1,1-DICHLOROETHYLENE-INDUCED HEPATOTOXICITY AND LETHALITY IN RATS. *(E.)* Jaeger, R. J.; Conolly, R. B.; Murphy, S. D. (Harvard Sch. Public Health, Boston, Mass.). *Exp. Mol. Pathol.* 20(2):187-198, 1974.

3533 THE REACTION PATTERN OF LIVER-PEROXYSOMES (=MICROBODIES) DURING CELL-INJURY. *(Ger.)* Riede, U. N.; Rohr, H. P. (Inst. Pathol., Univ. Basel, Switzerland). *Beitr. Pathol.* 151(2):111-133, 1974.

3534 BILE FLOW AND COMPOSITION DURING BILE ACID DEPLETION AND ADMINISTRATION. *(E.)* Klaassen, C. D. (Univ. Kansas Med. Ctr., Kansas City). *Can. J. Physiol. Pharmacol.* 52(2):334-348, 1974.

3535 CHOLELITHIASIS IN MICE: EFFECTS OF DIFFERENT CHEMICALS UPON FORMATION AND PREVENTION OF GALLSTONES. *(E.)* Goswami, S. K.; Frey, C. F. (Wayne County Gen. Hosp., Eloise, Mich.). *J. Surg. Res.* 16(2):164-168, 1974.

3536 KARYOMETRIC-FEULGENPHOTOMETRICAL STUDIES ON LIVER REGENERATION FOLLOWING PARTIAL HEPATECTOMY IN LATE PHASES OF THIOACETAMIDE (TAA) INTOXICATION. *(E.)* Bader, G.; Bader, N. G.; Stiller, K. J. (Dept. Pathol. Anat., Friedrich Schiller Univ., Jena, Germany). *Exp. Pathol.* 9(1-2):9-15, 1974.

3537 FUNCTIONAL AND ULTRASTRUCTURAL CHANGES IN HEPATOCYTES DURING DEVELOPMENT OF ALLYL ALCOHOL NECROSIS. *(Rus.)* Blyuger, A. F.; Mayore, A. Y.; Bolotova, M. A.; Stozhe, T. Y.; Zaltsmane, V. K. (Riga Med. Inst., USSR). *Biull. Eksp. Biol. Med.* 77(3):109-113, 1974.

3538 PREVENTION BY AGING OR BY CYTOCHALASIN B OF PHALLOIDIN STIMULATED FORMATION OF MICROFILAMENTS IN CELL MEMBRANE PREPARATIONS OF RAT LIVER. *(E.)* Low, I.; Lengsfeld, A. M.; Wieland, T. (Max Planck Inst. Med. Res., Heidelberg, Germany). *Histochemistry* 38(3):253-258, 1974.

3539 EFFECT OF HYDROXYUREA AND 5-FLUOROURACIL ON ENZYME PATTERN AND ULTRASTRUCTURE OF LIVER, KIDNEY, AND PANCREAS IN RATS. *(Ger.)* Korfsmeier, K. H. (Anat. Inst., Univ. Wurzburg, Germany). *Histochemistry* 38(3):203-211, 1974.

3540 GLUCOSE-6-PHOSPHATASE HETEROGENEITY WITHIN THE HEPATIC LOBULE OF THE PHENOBARBITAL-TREATED RAT. *(E.)* Menard, D.; Renasse, W.; Drochmans, P.; Hugon, J. S. (Med. Ctr., Univ. Sherbrooke, Canada). *Histochemistry* 38(3):229-239, 1974.

3541 RELATION BETWEEN ZINC AND IRON AND PEROXIDATION OF LIPIDS IN LIVER HOMOGENATE IN CaEDTA-TREATED RATS. *(E.)* Chvaph, M.; Aronson, A. L.; Peng, Y. M. (Coll. Med., Univ. Arizona, Tucson). *Exp. Molec. Pathol.* 20(2):216-227, 1974.

3542 COMPARISON OF THE EFFECTS OF CLOFIBRATE AND HALOFENATE (MK-185) IN ISOLATED RAT HEPATOCYTES. *(E.)* Homcy, C. J.; Margolis, S. (Johns Hopkins Univ. Sch. Med., Baltimore, Md.). *Atherosclerosis* 19(3):381-391, 1974.

3543 CHOLESTERYL ESTER METABOLISM IN LIVER AND BLOOD PLASMA OF VARIOUS ANIMAL SPECIES. *(E.)* Stokke, K. T. (Rikshosp., Oslo, Norway). *Atherosclerosis* 19(3):393-406, 1974.

3544 EFFECT OF ETHANOL ON THE OXIDATIVE METABOLISM OF TRYPTAMINE BY RAT LIVER HOMOGENATE. *(E.)* Asaad, M. M.; Barry, III, H.; Clarke, D. E.; Dixit, B. N. (Sch. Pharm., Univ. Pittsburgh, Pa.). *Br. J. Pharmacol.* 50(1):277-282, 1974.

3545 INTERACTION BETWEEN HORMONES AND CYCLIC AMP IN REGULATING SPECIFIC HEPATIC ENZYME SYNTHESIS. *(E.)* Wicks, W. D.; Barnett, C. A.; McKibbin, J. B. (Med. Ctr., Univ. Colorado, Denver). *Fed. Proc.* 33(4):1105-1111, 1974.

3546 EFFECTS OF CYCLIC STARVATION-FEEDING AND OF SPLENECTOMY ON THE DEVELOPMENT OF HEMOSIDEROSIS IN RAT LIVERS. *(E.)* Richter, G. W. (Dept. Pathol., Univ. Rochester, N.Y.). *Am. J. Pathol.* 47(3):481-502, 1974.

3547 MITOCHONDRIAL CONFORMATION AND SWELLING-CONTRACTION REACTIVITY DURING EARLY LIVER REGENERATION. *(E.)* Verity, M. A.; Brown, W. J.; Cheung, M. (Dept. Pathol., Univ. California, Los Angeles). *Am. J. Pathol.* 74(2):241-258, 1974.

3548 SOME INDICES OF THE LIVER FUNCTIONS WITH PROTEIN-CHOLINE DEFICIENCY. *(Rus.)* Sergeeva, K. V.; Ostryanina, A. D. (Inst. Nutr., Moscow, USSR). *Vopr. Pitan.* (1):15-20, 1974.

3549 THE REGULATION OF CELLULAR VOLUME IN LIVER SLICES. *(E.)* Macknight, A. D. C.; Pilgrim, J. P.; Robinson, B. A. (Univ. Otago Med. Sch., Dunedin, New Zealand). *J. Physiol.* 238(2):279-294, 1974.

3550 INFLUENCE OF AZATHIOPRINE AND PREDNISONE ON RAT LIVER REGENERATION. *(E.)* Kort, W. J.; Van Der Post, J. (Med. Fac. Rotterdam, Netherlands). *Eur. Surg. Res.* 5(5):373-383, 1973.

See also, 3464, 3592, 3593, 3956, 4057, 4065.

1 EFFECT OF HYPOPHYSECTOMY ON THE FUNCTION AND MORPHOLOGY OF THE SMALL INTESTINE MU-
A IN THE RAT. *(Ger.)* Menge, H.; Bloch, R.; Warm,
Lorenz-Meyer, H.; Riecken, E. O. (Med. Clin.,
v. Marburg, Germany). *Verh. Dtsch. Ges. Inn. Med.*
1432-1434, 1972.

tological, morphometric, and histochemical exa-
ations were performed and, by means of an *in vivo*
fusion technique, glucose and glycine absorption
measured in the small intestine of 14 intact and
hypophysectomized rats. Of these 39 rats, 6 re-
ned untreated and, starting 4 weeks after surgery,
received substitution with growth hormone, 9 with
H, 6 with thyroxine, and 6 with gonadotropin for
eriod of 4 weeks. Examinations performed on un-
ated hypophysectomized rats 8 weeks after surgery
wed that the thickness of the wall of the small
estine was reduced, the lumen was narrowed, the
ght of the villi and depth of the crypts were
nificantly decreased, and the epithelium was
kedly flattened. A general reduction had occurred
epithelial enzyme activities, and values for glu-
e and glycine absorption were about 1/2 of those
nd in intact rats. A highly significant correla-
n was found between the height of the villi, on
one hand, and glucose and glycine absorption on
other. While growth hormone and thyroxine sub-
tution significantly increased body weight, the
ght of the villi, the depth of the crypts, and
cine absorption, these hormones caused only slight
reases in glucose absorption and had no effect on
of these parameters. These findings do not sug-
t that mucosal atrophy is compensated for by
ger epithelial cell lifetimes, as might be anti-
ated from the decrease which occurs in mitotic
ivity.

2 THE LACTASE-PHLORIZIN HYDROLASE COMPLEX IN THE HUMAN SMALL INTESTINE. *(Ger.)*
enz-Meyer, H.; Blum, A.; Semenza, G. (Biochem.
t., Federal Technical Coll., Zurich, Switzerland).
h. Dtsch. Ges. Inn. Med. 78:1413-1415, 1972.

orizin hydrolase, lactase, and sucrase were inves-
ated in homogenates of biopsies taken from the
er jejunum of 15 patients with no evidence of
trointestinal disease and of pieces of mucosa re-
ed from the jejunum of 2 other patients during
arotomy. The pH optimum of phlorizin hydrolase
pH 5, the K_m was 5 x 10^{-4}M, and almost all of
activity was precipitated when the homogenate
centrifuged at 150,000 g for 60 min, suggesting
t this enzyme is bound to membrane structures.
le no correlation was found between the activity
sucrase and that of phlorizin hydrolase, there
a significant correlation between lactase and
orizin hydrolase activities. The ratio of lac-
e to phlorizin hydrolase activity was 10:1. A
orizin hydrolase deficiency was observed in 4
ients with clinical evidence of a lactase defi-
ncy (abnormal lactose tolerance test). These
ymes differed significantly in the kinetics of
ir thermal inactivation, ruling out the possibili-
that lactase is responsible for hydrolyzing most
of the phlorizin. However, consideration of these data suggests that lactase accounts for 27% of phlorizin hydrolysis and has about 2.7% of the activity of phlorizin hydrolase. This is consistent with the finding that rat and hamster lactase can hydrolyze cellulose and many other β-glucosides. While native lactase in a homogenate of small intestine did cause slight competitive inhibition of phlorizin hydrolysis, this inhibitory effect was no longer evident after thermal denaturation of the homogenate. On the other hand, phlorizin caused significant competitive inhibition of lactose hydrolysis. These findings provide no evidence about whether one protein molecule or 2 molecules linked by noncovalent bonds is responsible for the activities of both enzymes.

3553 EFFECTS OF INTRADUODENAL ADMINISTRATION OF HCL AND GLUCOSE ON CIRCULATING IMMUNOREACTIVE SECRETIN AND INSULIN CONCENTRATIONS. *(E.)*
Boden, G.; Essa, N.; Owen, O. E.; Reichle, F. A.; Saraga, W. (Temple Univ. Health Sci. Ctr., Phila., Pa.). *J. Clin. Invest.* 53(4):1185-1193, 1974.

Portal and femoral venous dog blood samples were taken simultaneously before, during, and after intraduodenal infusion of HCl (21 mEQ/30 min) and glucose (131 ml/30 min). Mean portal venous immunoreactive secretin concentration of 6 dogs rose from 313 μU/ml before to 1060 μU/ml 10 min after initiation of the intestinal acidification. Femoral venous immunoreactive secretin concentration rose from 220 μU/ml before to 567 μU/ml 15 min after intestinal acidification. In the same 6 dogs, mean portal venous immunoreactive insulin concentration rose from 38 μM/ml before to 62 μU/ml at the end of the infusion. Pancreatic exocrine function was studied in 4 dogs. The rise in secretin concentration was followed by a highly significant increase in exocrine pancreatic flow rate and bicarbonate secretion. Glucose in concentrations from 2.5% to 10% had no detectable influence on portal or peripheral secretin concentration. Infusion of 50% glucose caused a slight decline in secretin concentration. The data indicate that immunoreactive secretin was released rapidly after intestinal acidification, continued to be secreted throughout the duration of HCl infusion, and was promptly distributed in the extracellular compartment. Endogenously released secretin apparently stimulates insulin secretion. The HCl-mediated insulinogenic effect of immunoreactive secretin, however, was too weak to influence peripheral immunoreactive insulin, glucose, and free fatty acid concentrations. The failure of intraduodenal glucose to stimulate secretin release suggests that secretin is not the insulin-stimulatory factory released from the gastrointestinal tract in response to oral glucose.

3554 THE ACTION OF SECRETIN AND PANCREOZYMIN ON SMALL-INTESTINAL ALKALINE PHOSPHATASE.
(E.) Warnes, T. W.; Hine, P.; Kay, G. (Manchester Roy. Infirm., England). *Gut* 15(1):39-47, 1974.

Secretin (1.7 Crick-Harper-Raper (CHR) U/kg) and pancreozymin (2.0 CHR U/kg) were administered i.v. to 16 normal humans, and the effects on the alkaline phosphatases of the bile, pancreas, and intestinal mucosa studied. Both hormones caused a significant rise in the output of alkaline phosphatase accompanied by a flow of bile and pancreatic juices into duodenal juice. There was no increase in sucrase or lactase in the duodenal juice. Pancreozymin caused a rise in bilirubin and pancreatic enzymes, while secretin caused a rise only in pancreatic enzymes. Secretin and pancreozymin also caused a rise in the output of alkaline phosphatase in 7 patients with complete obstruction to both the pancreatic and common bile ducts. In these patients, as well as in the normal subjects, the alkaline phosphatase was identified as intestinal in origin. Thus, both secretin and pancreozymin must cause small intestinal alkaline phosphatase to be released into the duodenal juice.

3555 THE EFFECT OF ASPIRIN ON DUODENAL SECRETION. *(E.)* Russell, T. R.; Jones, R. S. (Univ. California Sch. Med., San Francisco). *Proc. Soc. Exp. Biol. Med.* 145(3):967-969, 1974.

Volume secretions from duodenal pouches in mongrel dogs were measured before, during, and after aspirin administration (600 mg p.o. twice daily for 7 consecutive days). Aspirin was associated with a statistically significant decrease in duodenal secretory response to a meal. Before aspirin administration, duodenal secretion rose from 0.1 ml/15 min to a peak of 0.64 ml/15 min which occurred 1 hr after feeding. During aspirin administration, basal duodenal secretion was 0.04 ml/15 min and peaked at 0.27 ml/15 min during the sixth 15-min period following feeding. After aspirin was discontinued, duodenal secretion rose from a basal value of 0.02 ml/15 to a peak of 0.37 ml/15 min the fifth 15-min period after feeding; it subsequently declined to 0.1 ml/15 min at the end of the fourth hr after feeding. These results are due to the systemic effect of aspirin, as there was no direct contact of aspirin with duodenal mucosa.

3556 SOME OBSERVATION ON THE SMALL INTESTINAL OLIGOSACCHARIDASE ACTIVITIES IN NORMAL AND ALLOXAN DIABETES, BEFORE AND AFTER INSULIN THERAPY. *(E.)* Sharma, A. K.; Ghosh, A. K. (Coll. Med., Calcutta Univ., India). *Japan. J. Exp. Med.* 43(5): 443-446, 1973.

Studies on intestinal oligosaccharidase activity in normal and alloxan diabetes before and after insulin therapy were performed on albino rats. In alloxan diabetes, the activities of lactase, sucrase, and maltase were stimulated by 59.6%, 7.3%, and 31.4% respectively. After insulin therapy (2 units/100 g i.m. for 12 days) the lactase activity was reduced to 23.3% but sucrase and maltase activities were further stimulated by 40.5% and 37.8%, respectively. In normal rats after prolonged insulin therapy (2 units/100 g i.m. for 12 days), the lactase, sucrase, and maltase activities were stimulated by 41%, 46.6%, and 45.7%, respectively. The stimulation of lactase activity in alloxan diabetes was further proved by lactose absorption test in rabbits. There was much elevation of lactose absorption in alloxan diabetes, and after insulin therapy (5 units/kg of body weight) the lactose absorption was greatly reduced.

3557 METABOLISM OF TETRAHYDROCANNABINOL BY THE SMALL INTESTINE. *(E.)* Greene, M. L.; Saunders, D. R. (Dept. Med., Univ. Washington, Seattle). *Gastroenterology* 66(3):365-372, 1974.

The psychotomimetic effects of marihuana are probably due to hydroxylated metabolites of tetrahydrocannabinol (Δ^9THC), the major active alkaloid of the cannabis plant. Jejunal biopsies from normal volunteers were incubated in oxygenated flasks with purified ^{14}C-Δ^9THC (1.7 to 2.5 g/ml) in a nutrient medium. The activity of fresh biopsies was compared with that of control biopsies heated to 100 C for 3 min prior to their addition to the flask. After incubation and extraction, unchanged ^{14}C-Δ^9THC and its metabolites were chromatographically separated and quantified. In 6 experiments, an average of 5.4% of added ^{14}C-Δ^9THC was converted to polar metabolites in 2 hr. Metabolite formation was approximately linearly related to the duration of incubation and to tissue weight. The major (62%) polar metabolite of Δ^9THC formed by human jejunal mucosa had the chromatographic mobility of 11-hydroxy THC. To define the route whereby absorbed Δ^9THC and its metabolites leave the gut, ^{3}H-oleic acid and ^{14}C-Δ^9THC were fed intraduodenally to 2 rats equipped with thoracic duct fistulas. Over a period of 24 hr, 75% of the ^{3}H but only 1.3% of the ^{14}C were recovered in the lymph. The urine contained 12% of the administered ^{14}C. The portal absorption of ^{14}C-Δ^9THC was demonstrated in 4 intact rats: 30 min after feeding the labeled drug intraduodenally, the portal blood contained 3 to 4 times as much ^{14}C as did simultaneously sampled inferior vena caval blood. About half of the portal ^{14}C consisted of polar metabolites of Δ^9THC. Rat jejunal slices were also able to metabolize Δ^9THC. Thus, the human small intestinal mucosa is able to hydroxylate Δ^9THC. These cannabinoids are probably transported from the intestinal absorptive cells by the portal venous system.

3558 CALCIFEROL METABOLISM AND INTESTINAL CALCIUM TRANSPORT IN THE CHICK WITH REDUCED RENAL FUNCTION. *(E.)* Hartenbower, D. L.; Coburn, J. W.; Reddy, C. R.; Norman, A. W. (Wadsworth Hosp. Ctr., Los Angeles, Calif.). *J. Lab. Clin. Med.* 83(1):38-45, 1974.

The metabolism of ^{3}H- and ^{14}C-labeled cholecalcifero (vitamin D_3) and the intestinal transport of calcium, as measured *in vitro*, were evaluated in chicks with renal insufficiency of 7-10 days duration and in sham-operated control chicks. Previous treatment with nonradioactive D_3 was suboptimal, averaging 0.7-3.4 IU/day compared with normal requirements of 10-20 IU/day. Intestinal calcium transport was reduced in uremic chicks compared with control chicks. Also, there was reduced intestinal localization of labeled metabolite chromatographically identical to 1.25-dihydroxycholecalciferol (1,25(OH)$_2$D$_3$), the kidney-

oduced active form of D_3, in the uremic chicks
mpared with the sham-operated chicks. This dif-
rence was detectable only in the birds that re-
ived lower quantities of nonradioactive D_3. The
monstration of decreased quantities of $1,25(OH)_2D_3$
the intestine in association with impaired cal-
um transport are consistent with the theory that
duced availability of $1,25(OH)_2D_3$ may underlie the
normality of calcium absorption found in uremia.

59 ON THE DETERMINATION OF INTESTINAL EPITHELIAL CELL GENERATION TIME FROM LABELING
DEX AND DNA SYNTHESIS DURATION.

(E.) Cooper,
W.; Hagemann, R. F.; Brodmerkel, Jr., G. J. (Al-
gheny Gen. Hosp., Pittsburgh, Pa.). *Experientia*
(2):186-188, 1974.

le C57BL/J mice, some of which had been exposed
three X-ray treatments (300 r each), were injec-
d i.p. with 20 or 50 μCi of tritiated thymidine.
e labeling index was then determined in samples
jejunum, ascending colon, and descending colon.
addition, the labeling index was determined in
roral biopsy specimens of jejunum obtained from
patients and samples of ascending colon obtained
om 2 patients following surgery. Following ir-
diation, the jejunal generation cycle in the mur-
e samples was shortened (from 13.1 to 10.3 hr),
was the generation cycle in the ascending colon
rom 21.8 to 11.4 hr). For the mouse small intes-
ne and colon the relation Tg = Ts/LI (where Tg is
e generation time in hours, Ts is the duration
the S phase in hours, and LI represents the
action of labeled cells following a pulse expos-
e to tritiated thymidine) appears to be valid.
e labeling index in the proliferative zone of
man jejunal crypts averaged 34.5%, while the
beling index in the human colon averaged 40.6%,
elding a calculated generation time of 34.5 to
.2 hr. The potential errors in using Tg = Ts/
appear to result from the inclusion of goblet
lls and maturing columnar cells in the calcula-
ons.

60 TWO-TO-THREE DAY INTESTINAL PRESERVATION UTILIZING HYPOTHERMIC PULSATILE PERFUSION.

.) Toledo-Pereyra, L. H.; Simmons, R. L.; Najari-
, J. S. (Dept. Surg., Univ. Minnesota, Minneapolis).
n. Surg. 179(4):454-459, 1974.

e effects of hypothermic pulsatile perfusion with
bloodless perfusate on the survival of the canine
all bowel were studied, along with the functional
rameters of intestinal viability during storage.
nine small intestine was preserved by hypothermic
lsatile perfusion for periods up to 72 hr. During
e first 48 hr, there was a steady loss of perfu-
te into the bowel with a consequent organ weight
in. After 48 hr, the resistance of perfusion
se rapidly with consequent rises in perfusion pres-
re and falls in flow rate. The osmolarity of the
rfusate did not change significantly, although,
ter 48 hr, the sodium concentration fell slightly,
ile the potassium and lactic acid concentrations
se rapidly. There was a gradual and steady in-
ease in the LDH, SGOT, and B-glucuronidase concentrations of the perfusate. After 48 hr, d-xylose from the lumen rapidly entered the perfusate. The volume of intestinal secretions increased gradually during perfusion, as did the levels of total protein, globulin, sodium, and potassium. After 48 hr, acidosis, hypocapnia, and low oxygen consumption became increasingly severe as perfusate flow decreased and vascular resistance rose. Orthotopic intestinal allotransplantation was carried out in six intestines perfused for 72 hr. Immediately after revascularization there was gross evidence of serosal and mesenteric hemorrhage, with no microscopic evidence of mucosal damage. Intestinal transplantation was also carried out after 48 hr of perfusion in 14 dogs. Immediately after revascularization, there were signs of active tone and peristalisis with erythema of the serosa; biopsy revealed minimal interstitial inflammation.

3561 CHEMICAL AND HISTOCHEMICAL STUDIES OF POSTOPERATIVE SYMPATHETIC ACTIVITY IN THE DIGESTIVE TRACT IN RATS.

(E.) Dubois, A.; Kopin, I. J.; Pettigrew, K. D.; Jacobowitz, D. M. (Natl. Cancer Inst., Bethesda, Md.). *Gastroenterology* 66(3):403-407, 1974.

In the rat, the postoperative inhibition of gastrointestinal propulsion is accompanied by the increased synthesis of norepinephrine from ^{14}C-tyrosine. Endogenous stores of norepinephrine are not significantly modified. The peripheral sympathetic response to abdominal surgery was further examined by blocking norepinephrine synthesis in male albino rats with α-methyl-p-tyrosine (αMPT). The rate of decline of tissue norepinephrine stores was taken as an index of local adrenergic activity. Twelve hr after intestinal exteriorization, the αMPT-induced decrease in digestive tract norepinephrine was more profound than in unoperated rats. This difference was not observed in the heart. Histofluorescence studies showed that neither surgery nor αMPT treatment modified the distribution of norepinephrine in the gut wall. In operated αMPT-treated animals, there was a dramatic decrease in fluorescent intensity in the noradrenergic nerves of the Auerbach plexus, the Meissner plexus, and the circular muscle. The intensity of fluorescence in the perivascular adrenergic nerves was unaltered. The difference between the perivascular and the myenteric plexus in relation to the depletion of norepinephrine by αMPT is probably due to a more rapid turnover of the catecholamine in the plexus. Intestinal manipulations thus appear to increase both the synthesis and release of norepinephrine from noradrenergic nerves in the gut wall. This local hyperactivity of the sympathetic nerves could account for the postoperative ileus observed in man.

3562 ANTAGONISM OF METHADONE'S INTESTINAL EFFECTS BY CYPROHEPTADINE.

(E.) Kennedy, D. K.; Grubb, M. N.; Burks, T. F. (Univ. Texas Med. Sch., Houston). *Gastroenterology* 66(3):396-402, 1974.

The narcotic agonist methadone increases the amplitude of intestinal phasic contractions and can retard intestinal propulsive activity. Like morphine, methadone may produce its intestinal effects *via* the release of local 5-hydroxytryptamine (5-HT). The ability of the 5-HT receptor blocking agent cyproheptadine to antagonize the intestinal effects of methadone was evaluated *in vitro* and *in vivo*. In vascularly perfused segments of isolated canine intestine, cyproheptadine (1 μg/ml) decreased the stimulatory effect of methadone and 5-HT, but not the effect produced by bethanechol, a cholinergic agonist. Atropine decreased the responses to methadone, 5-HT, and bethanechol because one component of 5-HT action is mediated by intramural cholinergic nerves. Cyproheptadine also antagonized the methadone-induced reduction in transit of test meals in mice. The LD_{50} of methadone (28.3 mg/kg) was not altered by cyproheptadine (10 mg/kg). The ability of a 5-HT blocking agent to antagonize the intestinal effects of methadone suggests a potentially useful means of overcoming one of the troublesome side effects of the narcotic drugs.

3563 STUDY OF PANETH CELL SECRETION USING LYSOZYME AS A MARKER. *(E.)* Peeters, T.; Vantrappen, G. (Dept. Med. Res., Univ. Louvain, Belgium). *Gastroenterology* 66(4):758, 1974.

3564 ABSENCE OF SIGNIFICANT RATES OF GLUCONEOGENESIS IN INTESTINAL MUCOSA OF STARVED GUINEA PIGS. *(E.)* Lamers, J. M. J.; Kurpershoek-Davidov, R.; Hulsmann, W. C. (Fac. Med., Erasmus Univ., Rotterdam, Netherlands). *Biochim. Biophys. Acta* 343(2):427-430, 1974.

3565 STRUCTURE AND HISTOCHEMISTRY OF THE NORMAL INTESTINE OF THE FOWL. II. DISTRIBUTION OF ENZYME ACTIVITIES IN THE DUODENAL AND JEJUNAL MUCOSA. *(E.)* Michael, E.; Hodges, R. D. (Wye Coll., Univ. London, England). *Histochem. J.* 6(2):133-145, 1974.

3566 THE EFFECTS OF FATTY ACIDS ON OXIDATIVE DECARBOXYLATION OF PYRUVATE IN RAT SMALL INTESTINE. *(E.)* Lamers, J. M. J.; Hulsmann, W. C. (Fac. Med., Erasmus Univ., Rotterdam, Netherlands). *Biochim. Biophys. Acta* 343(1):215-225, 1974.

3567 OXIDATIVE METABOLISM OF RABBIT ILEAL MUCOSA. *(E.)* Frizzell, R. A.; Markscheid-Kaspi, L.; Schultz, S. G. (Univ. Pittsburgh Sch. Med. Pa.). *Am. J. Physiol.* 226(5):1142-1148, 1974.

3568 THE EFFECT OF ALDOSTERONE ON COLONIC POTENTIAL DIFFERENCE AND RENAL ELECTROLYTE EXCRETION IN NORMAL MAN. *(E.)* Efstratopoulos, A. D.; Peart, W. S.; Wilson, G. A. (St. Mary's Hosp. Med. Sch., London, England). *Clin. Sci. Mol. Med.* 46(4):489-499, 1974.

3569 INTESTINAL SECRETION. *(E.)* Field, M. (Harvard Med. Sch., Boston, Mass.). *Gastroenterology* 66(5):1063-1084, 1974.

See also, 3409, 3423, 3448, 3578.

GENERAL

3570 PREDICTION OF THE VIABILITY OF REVASCULARIZED INTESTINE WITH RADIOACTIVE MICROSPHERES. *(E.)* Zarins, C. K.; Skinner, D. B.; Rhodes, B. A.; James, Jr., A. E. (Dept. Surg., Univ. Michigan, Ann Arbor). *Surg. Gynecol. Obstet.* 138(4):576-580, 1974.

Vascular supply to the terminal portion of the ileum was occluded in 16 adult beagle dogs. After an ischemic period of 4-10 hr, the segment was revascularized. After periods of 10 min, 4 days, and 1 month, radionuclide-labeled microspheres were injected into the aortic blood stream to assess microcirculatory blood flow. Of 14 scintiscans performed 10 min after revascularization, 5 were hyperemic, 4 were normal, and 5 were ischemic. All 5 dogs with hyperemic scintiscans had viable intestines with normal color and vascular pulsations after revascularization. All 4 dogs with normal scintiscans had grossly normal viable intestines, but 1 dog died of intestinal infarction after 4 days and another was moribund and had cachexia after 1 month due to stricture of the ischemic segment. Among the 5 dogs with ischemic scintiscans, 3 intestinal segments appeared grossly viable and two appeared necrotic after revascularization; none proved to be viable. As the duration of ischemia progressed, the hyperemic response diminished. Follow-up observation scintiscans at 4 days and 1 month showed the persistence of hyperemia in previously ischemic intestinal segments: hyperemia detected at these times correlated with injured tissue. The data indicate that hyperemia or ischemia as seen by scintiscanning immediately after revascularization was a useful prognostic indicator of viability, while normal scintiscans were of indeterminate predictive value. Clinical evaluation of this technique seems warranted.

3571 EXPERIMENTAL SHIGELLOSIS AND INTESTINAL MALABSORPTION IN THE MOUSE. *(E.)* Madge, D. S. (Dept. Biol. Sci., Wye Coll., Ashford, Kent, England). *Comp. Biochem. Physiol.* 48A(2):343-359, 1974.

Inbred CS-1 mice were inoculated p.o. with suspen-

ions of human strains of *Shigella dysenteriae* and
flexneri, then injected i.p. with morphine sul-
ate to reduce intestinal peristalsis. After 1
eek, the infected animals showed decreased *in vitro*
ntestinal absorption of D-glucose, D-galactose,
-histidine, or L-arginine. Serosal fluid transfer
nd tissue fluid uptake were generally reduced. The
ffects of the infection disappeared after 2 weeks.
he absorption of D-glucose was decreased throughout
he small intestine. Intestinal fluid transfer
ell in the duodenum, jejunum, and proximal ileum,
ut rose in the distal ileum. The amounts of food
nd water taken by the infected mice did not change.
ody weight, as well as fresh weight and protein
ontent of the small intestine, also remained unal-
ered. The histology of the mucose changed mainly
istally. There is a glucose-dependent and glucose-
ndependent fluid transfer mechanism in the normal
ouse small intestine: the first is more important
roximally and the second is more important distally.
n animals with shigellosis, both mechanisms re-
ained unchanged in the proximal and mid-intestine
ut increased in the distal intestine. Thus, total
luid transfer in the infected intestine increased
rogressively along the intestine, unlike the nor-
l intestine where it is highest in the mid-intes-
ine and decreases proximally and distally.

72 ROLE OF THE INTRAINTESTINAL GRAM-NEGATIVE BACTERIAL FLORA IN RESPONSE TO MAJOR INJURY.
.) Hamer-Hodges, D.; Woodruff, P.; Cuevas, P.;
ufman, A.; Fine, J. (Boston City Hosp., Mass.).
rg. Gynecol. Obstet. 138(4):599-603, 1974.

series of adult white New Zealand rabbits harboring
nventional aerobic gram-negative basteria were
bjected to a lethal dose of i.v. administered
dotoxin, occlusion of the superior mesenteric
tery for 1 hr, and a 30% immersion burn. All of
ese injuries produced fatal endotoxic shock within
hr. The same injuries were inflicted on another
ries of rabbits which were comparable in all
spects except that the aerobic gram-negative bac-
ria were either absent or present in small numbers
the cecum, the bacterial count in the cecum being
low 10^5 instead of 10^9 or 10^{10} and the endotoxin
ter being below 0.125 mg as compared with 6 mg/g
cecal content. Endotoxemia of intestinal origin
veloped in the first series shortly after the in-
ry was inflicted and caused fatal shock within 12
. None of the animals in the second series de-
loped endotoxemia or shock, and some were alive
d well 24 hr later. However, in rabbits in which
e intestines were preloaded with gram-negative
ora in a fluid containing nutrients shortly before
jury, endotoxemia did develop and the mortality
te was substantially greater. Thus, the intrain-
stinal gram-negative flora and their endotoxins
pear to be the source of additional injury which
n account for the shock and death which follow
rious types of major trauma.

73 EFFECT OF A TOPICAL ADRENERGIC AGENT ON GASTRIC BLOOD FLOW. *(E.)* Waterman, N.
; Walker, J. L. (Univ. Louisville Sch. Med., Ky.).
. J. Surg. 127(3):241-243, 1974.

Irrigation of the stomach with saline containing levarterenol (16 mg/liter) had only a small additive effect on the reduction of gastric blood flow in dogs, regardless of the temperature of the saline. Gastric irrigation with saline at 38 C decreased blood flow by 10%, while irrigation with iced saline decreased it by 50%. Addition of levarterenol to saline at 38 C or at 6-8 C further decreased blood flow by 8 and 10%, resp., between 15 and 30 min after initiation of the irrigation. Since gastric cooling can adversely affect hemostatic mechanisms, a controlled clinical study is needed to determine the effectiveness of the various methods of gastric irrigation in the treatment of upper gastrointestinal bleeding.

3574 PROLONGED SURVIVAL OF CANINE ORTHOTOPIC SMALL INTESTINAL ALLOGRAFTS PRESERVED FOR 24 HOURS BY HYPOTHERMIC BLOODLESS PERFUSION. *(E.)* Toledo-Pareyra, L. H.; Simmons, R. L.; Najarian, J. S. (Dept. Surg., Univ. Minnesota, Minneapolis). *Surgery* 75(3):368-376, 1974.

Whole orthotopic small intestinal transplants were carried out in moderately immunosuppressed dogs. Survival times were compared for dogs with fresh grafts and those with grafts preserved by hypothermic bloodless pulsatile perfusion for 24 hr. Two perfusates were used during preservation: cryoprecipitated pooled dog plasma or human plasmanate. Survival was significantly better in the dogs which received the preserved grafts than in animals with fresh transplants (mean survival, 14.5 days). The best survival time was achieved with intestinal allografts perfused with human plasmanate (mean survival, 45 days; the longest, 67 days). These results suggest that significant prolongation of allograft survival in moderately immunosuppressed animals might be achieved by modification of graft immunogenicity upon preservation or by binding with nonspecific xenogeneic antibodies in a perfusate solution. Except for differences in survival, there were practically no clinical differences among the 3 groups of dogs. All animals lost weight at almost the same weight, and weight loss reached 30% in dogs which survived more than 6 weeks after grafting. Anemia and hypoproteinemia with hypoalbuminemia were constant features in all dogs and preoperative values were not attained in any animal, although slight improvement in serum protein and albumin levels were observed 5 weeks after transplantation in the human plasmanate group.

3575 POLYSACCHARIDES IN HUMAN GALLBLADDER WALL AND BILE. *(E.)* Terho, T.; Laitio, M. (Dept. Physiol., Univ. Turku, Finland). *Biochim. Biophys. Acta* 338(1):135-150, 1974.

Polysaccharides in human gallbladder wall and bile were isolated and characterized. In the gallbladder wall hyaluronic acid, heparin sulfate, dermatan sulfate and chondroitin 4- and/or 6-sulfate were found. Most hyaluronic acid and chondroitin 4- and/or 6-sulfate proteoglycan were extractable with 0.9% NaCl from the gallbladder wall, whereas dermatan sulfate proteoglycan was almost insoluble in 0.9% NaCl. In bile, hyaluronic acid and chondroitin 4- and/or 6-sulfate were found only in trace amounts. Both from the gallbladder wall and from bile, 2 large molecular polysaccharides were isolated, which were assumed to be the polysaccharide parts of so-called mucins. The polysaccharides were composed of glucosamine, galactosamine, and galactose (in the ratio of 3:1:4 or 9:1:10) and of different amounts of fucose, sialic acid, and sulfate. The polysaccharides were fractionated further according to their sialic acid and sulfate content. In addition, large amounts of small molecular polysaccharides were isolated from the gallbladder wall and bile. These polysaccharides consisted of varying amounts of glucosamine, galactose, glucose, mannose, fucose, and sialic acids. In the gallbladder wall these polysaccharides (at the glycoprotein stage) were both soluble and insoluble in 0.9% NaCl. The insoluble polysaccharides were assumed to originate from structural or membrane-bound glycoproteins, e.g., plasma membrane glycoproteins.

3576 EFFECT OF ETHANOL ON THE TRANSPORT OF NUCLEOSIDES INTO PRIMARY CHICK FIBROBLASTS.

(E.) Scholtissek, C. (Inst. Virol., Justus Liebig-Univ., Giessen, Germany). *Biochim. Biophys. Acta* 335(3):290-294, 1974.

In primary tissue cultures prepared from 11-day-old chick embryos in Petri dishes, the uptake of labeled uridine is considerably inhibited by ethanol in a dose-response relationship. To reduce the uptake of guanosine to a comparable level an approximately 2-fold higher concentration of ethanol has to be employed. In the case of adenosine the concentration of ethanol is even 5 times as high. Since the inhibition of the incorporation of labeled uridine into RNA parallels the inhibition of the uptake into the acid-soluble pool, a direct interference with RNA synthesis does not seem to occur. The incorporation of $[^3H]$UTP prelabeled at 4 C *in vivo* into RNA is not significantly influenced by ethanol during the first 30 min of incubation at 37 C. The incorporation of labeled leucine and the multiplication of fowl plague virus are also severely inhibited by ethanol. All these effects are reversible. When ethanol is added to the cultures at concentrations higher than 10%, the cell layers show microscopically visible cytotoxic effects. In the presence of 9% ethanol, prelabeled UTP is lost from the cells during incubation at 37 C. Incubation with 9% ethanol for 90 min has only a little effect on the ATP pool. The effect on the GTP pool is negligible. Ethanol at concentrations of 6% and above has a significant depressive effect on the uridine kinase (30% depression by 6% and 50% depression by 9% ethanol). However, the rather drastic effect of ethanol even at low concentrations on the uptake of uridine cannot be merely explained by its influence on the pyrimidine nucleoside kinase activity.

3577 SEQUENCE OF EVENTS MEDIATING THE EFFECT OF CHOLERA TOXIN ON RAT THYMOCYTES. *(E.)*

Boyle, J. M.; Gardner, J. D. (Natl. Inst. Hlth., Bethesda, Md.). *J. Clin. Invest.* 53(4):1149-1158, 1974.

In rat thymocytes, binding of (^{125}I)choleragen was followed by cellular accumulation of cyclic 3',5'-AMP which, in turn, was followed by stimulation of amino acid transport. Binding of cholera toxin was complete by 30 min and remained constant for the subsequent 150 min. After stimulation by choleragen, cellular cyclic 3',5'-AMP became maximal by 30 min, after which it declined steadily so that by 90 min of incubation, cellular cyclic nucleotide levels were only 20% of those seen at 30 min. Stimulation of amino acid transport, although detectable by 15 min, did not become maximal until 120 min (by which time cellular cyclic 3',5'-AMP had decreased by more than 80%). This system was also used to delineate the step at which various pharmacologic agents and hormones act to alter the sequence of events mediating the response of rat thymocytes to cholera toxin. The ability of cycloheximide to abolish choleragen-stimulated amino acid influx without reducing (^{125}I)-choleragen binding or cellular cyclic 3',5'-AMP suggests that cyclic nucleotide stimulation of amino acid transport includes a step involving protein synthesis.

3578 SYNERGISM BETWEEN ECOLOGIC AND IMMUNOLOGIC CONTROL MECHANISMS OF INTESTINAL FLORA.

(E.) Shedlofsky, S.; Freter, R. (Dept. Microbiol., Univ. Michigan, Ann Arbor). *J. Infect. Dis.* 129(3):296-303, 1974.

A hypothesis postulating that local antibacterial immunity may act synergistically with bacterial antagonism in controlling bacterial populations in the intestine was studied. In germ-free Charles River mice monoassociated with *Vibrio cholerae*, bacterial counts were in the order of 10^9 to 10^{10} bacteria/cecu If mice had been vaccinated with *V. cholerae* by either p.o. or parenteral routes, the vibrio counts were lowered by factors of only 1.55-2.82. In germ-free mice in which antagonistic bacteria had been implanted before challenge with vibrios, viable counts were about 10^5 to 10^8 vibrios/cecum. If these mice were vaccinated, the vibrio counts were lowered by factors of 4.72 to 61.1. Local antibacterial immunity was therefore considerably more effective when it operated in conjunction with bacterial antagonism. The most important function of local antibacterial immunity appears to be protection against invading bacteria, including pathogens such as *V. cholerae* and *Escherichia coli*. However, local immunity appears to function only if the initial populations of these invaders are kept small by such mechanisms as peristalsis in the small intestine or the antagonistic action of a properly functioning normal flora in the mouth, throat, or large intestine

3579 SIMILARITIES BETWEEN ONE OF THE MULTIPLE FORMS OF PEPTIDE HYDROLASE PURIFIED FROM BRUSH-BORDER AND CYTOSOL FRACTIONS OF GUINEA PIG INTESTINAL MUCOSA.

(E.) O'Cuinn, G.; Donlon, J.; Fottrell, P. F. (Dept. Biochem., Univ. Coll., Galway, Ireland). *FEBS Lett.* 39(2):225-228, 1974.

In guinea pigs, properties of one of the forms of peptide hydrolase isolated from the cytosol of the enterocytes were compared with an

yme of similar electrophoretic mobility,
ified from brush-border fractions. When aliquots
the purified brush border α peptide hydrolase were
ubated with equal volumes of various dilutions of
i-cytosol α peptide hydrolase antibody, the re-
tant complex was precipitated by centrifugation
30,000 g for 15 min. When a γ globulin prepara-
n from control rabbit serum was substituted for
antiserum, the peptide hydrolase activity was
precipitated but remained in the supernatant af-
centrifugation. When cytosol and brush border
yme preparations were preincubated with antiserum
control serum and the mixtures run on starch-gel
ctrophoresis, the resultant zymograms indicated
t the antiserum reacted only with the α peptide
rolase of both brush-borders and cytosol. Thir-
n dipeptides and 4 tripeptides were used to compare
substrate specificities of the cytosol and brush
der enzymes. Both enzymes hydrolysed the same
strates and had no effect on peptides containing
line or acidic amino acid residues with the ex-
tion of L-Glu-L-Tyr. Various divalent cations
e tested for their ability to stimulate hydrolysis
L-Leu-L-Leu by the brush-border hydrolase. Both
ganese (0.5 mM) and magnesium (0.5 mM) promoted
rolysis, the managanese ion being more efficient.
c and cobalt inhibited hydrolysis while calcium
the same concentration (0.5 mM) had little effect.
is concluded that at least one of the multiple
ms of peptide hydrolase i.e., α peptide hydrolase
very similar properties when isolated from either
cytosol or brush-border fractions of guinea-pig
estinal mucosa.

0 HEMODYNAMIC OBSERVATIONS OF ADYNAMIC ILEUS
IN THE CONSCIOUS DOG. *(E.)* Abe, H.; Ap-
t, H. E.; Howard, J. M. (Hahnemann Med. Coll.,
la., Pa.). *Ann. Surg.* 179(3):332-338, 1974.

emodynamic study on mongrel dogs was performed in
course of acute peritonitis due to appendiceal
ation. Adynamic ileus developed approximately
r after the procedure. The mechanical activity
the ileum was greatly reduced within the first 6
and was associated with a similar reduction in
number of spike potentials which could be ob-
ved. Slow wave electrical activity, however, was
tained and was relatively unchanged in rate and
litude until the time of death. Intestinal motili-
and splanchnic hemodynamics appeared to undergo
tages of deterioration. An initial response to
ury, a stage of inflammation, a stage of adynamic
us, and a stage of peripheral vascular collapse
ld be distinguished. The superior mesenteric ar-
y flow and resistance returned to approximately
trol values during the stage of ileus. In the
ly stage of vascular collapse, flow began to de-
ase and the resistance was increased. It is pro-
ed that these hemodynamic changes are related
e to the humoral factors than to simple splanchnic
ve stimulation.

1 INFLUENCES OF DIETARY AND ENVIRONMENTAL
STRESS ON MICROBIAL POPULATIONS IN THE
INE GASTROINTESTINAL TRACT. *(E.)* Tannock, G. W.; Savage, D. C. (Dept. Microbiol., Univ. Illinois, Urbana). *Infect. Immun.* 9(3):591-598, 1974.

Aerobic and anaerobic cultural techniques and histological methods were used in a study of the effects of environmental and dietary stress on the indigenous microbiota of the gastrointestinal tract of mice. Mice previously inoculated with *Salmonella typhimurium* were examined in a similar manner. Three strains of mice (CD-1, Ha/ICr, and C57BL) were used. Control animals previously inoculated with *S. typhimurium* had low population levels of *Salmonella* bacteria in the small and large bowel. Mice previously inoculated with *Salmonella* and then deprived of food, water, and bedding for 48 hr harbored high population levels of these bacteria in their small and large bowels. Coliforms increased in numbers in the large bowel of stressed mice inoculated with *Salmonella* and in the jejunum-ileum and cecum of stressed mice not previously inoculated. Control mice had high population levels of lactobacilli inhabiting the keratinized squamous epithelium of the stomach. Stressed mice showed dramatic reductions in these populations of lactobacilli. Populations of fusiform-shaped bacteria associated with the mucosal epithelium of the cecum and colon in control mice were reduced in stressed mice as determined by microscope examination of histological sections. Total anaerobic counts were similar, however, in both stressed and control animals. Environmental and dietary stress markedly alter the gastrointestinal microbiota in mice. Therefore, such stressful conditions profoundly affect the factors that regulate the localization and population levels of microorganisms in the stomach and intestines.

3582 FURTHER OBSERVATIONS ON THE INTERACTION OF PROSTAGLANDIN $F_{2\alpha}$ WITH CHOLINERGIC MECHANISMS IN CANINE SALIVARY GLANDS. *(E.)* Hahn, R. A.; Patil, P. N. (Coll. Pharm., Ohio State Univ., Columbus). *Eur. J. Pharmacol.* 25(2):279-286, 1974.

3583 PEPSINOGEN POLYMORPHISM FREQUENCIES IN A NEGRO POPULATION. *(E.)* Townes, P. L.; White, M. R. (Univ. Rochester Sch. Med., N.Y.). *Am. J. Hum. Genet.* 26(2):252-254, 1974.

3584 ULTRASTRUCTURAL RADIATION INJURY OF RAT PAROTID GLAND: A HISTOPATHOLOGIC DOSE-RESPONSE STUDY. *(E.)* Sodicoff, M.; Pratt, N. E.; Sholley, M. M. (Temple Univ. Sch. Med., Philadelphia, Pa.). *Radiat. Res.* 58(2):196-208, 1974.

3585 SERUM INTESTINAL ALKALINE PHOSPHATASE AFTER ACUTE MESENTERIC INFARCTION. *(E.)* Caldwell, J. H. (Ohio State Univ. Coll. Med., Columbus). *Gastroenterology* 66(4):670, 1974.

3586 PROXIMAL GASTRIC VAGOTOMY WITHOUT "DRAINAGE": AN EXPERIMENTAL STUDY. *(E.)* Hallenbeck, G. A.; Gleysteen, J. (Univ. Alabama Sch. Med., Birmingham). *Ann. Surg.* 179(5):608-617, 1974.

3587 A PHARMACOLOGICAL STUDY OF INTESTINAL VASODILATOR MECHANISMS IN THE CAT. *(E.)* Biber, B.; Fara, J.; Lundgren, O. (Dept. Physiol., Univ. Goteborg, Sweden). *Acta Physiol. Scand.* 90(4):673-683, 1974.

3588 EXPERIMENTAL YERSINIA ENTEROCOLITICA INFECTION IN MICE: KINETICS OF GROWTH. *(E.)* Carter, P. B.; Collins, F. M. (Trudeau Inst., Inc., Saranac Lake, N.Y.). *Infect. Immun.* 9(5):851-857, 1974.

3589 CHOLECYSTOKININ AND INTESTINAL SATIETY IN THE RAT. *(E.)* Smith, G. P.; Gibbs, J.; Young, R. C. (Cornell Univ. Med. Coll., White Plains, N.Y.). *Fed. Proc.* 33(5):1146-1149, 1974.

3590 THE SUBCELLULAR DISTRIBUTION OF GLYCOLIPIDS OF DOG INTESTINAL MUCOSA. *(E.)* Smith, E. L.; McKibbin, J. M. (Dept. Biochem., Univ. Alabama, Birmingham). *Ala. J. Med. Sci.* 10(4):417-422, 1973.

3591 THE SMALL INTESTINE IN HEMORRHAGIC SHOCK. *(E.)* Haglund, U.; Lundgren, O. (Dept. Physiol., Univ. Goteborg, Sweden). *Gastroenterology* 66(4):625-627, 1974.

3592 STUDIES ON IRON LOADING OF RAT LIVER LYSOSOMES. CHEMICAL AND ENZYMIC COMPOSITION. *(E.)* Arborgh, B. A. M.; Glaumann, H.; Ericsson, J. L. E. (Sabbatsberg's Hosp., Stockholm, Sweden). *Lab. Invest.* 30(5):674-680, 1974.

3593 STUDIES ON BILE. PART I. QUICK METHOD OF CHOLIC ACID ESTIMATION IN BILE/BILE CONCENTRATE. *(E.)* Jamal, N.; Hussain, N.; Ali, S. A. M. (PCSIR Lab., Karachi, Pakistan). *Pakistan J. Sci. Ind. Res.* 16(3/4):112-114, 1973.

3594 THE CALCIUM AND MAGNESIUM CONTENT IN THE SOLUBLE AND MICROSOMAL FRACTIONS OF NORMAL AND PARTIALLY HEPATECTOMIZED RAT LIVER. *(It.)* Leoni, S.; Mangiantini, M. T.; Spagnuolo, S. (Inst. Gen. Physiol., Univ. Rome, Italy). *Boll. Soc. Ital. Biol. Sper.* 49(10):550-555, 1973.

3595 VASOTROPIC ACTIVITY OF ARACHIDONIC ACID PEROXIDE ON THE ISOLATED MURINE PORTAL VEIN AND ITS MODIFICATION BY ANTIINFLAMMATORY SUBSTANCES. *(E.)* Helfer, H.; Jaques, R. (Ciba-Geigy Ltd., Basel, Switzerland). *Experientia* 30(2):172-173, 1974.

3596 POLYAMINE BIOSYNTHESIS IN HUMAN FETAL LIVER AND BRAIN. *(E.)* Sturman, J. A.; Gaull, G. E. (Inst. Brain Res., Staten Island, N.Y.). *Pediatr. Res.* 8(4):231-237, 1974.

3597 THRESHOLD CURVES AND REFRACTORINESS PROPERTIES OF GASTRIC RELAXATION OSCILLATORS. *(E.)* Sarna, S. K.; Daniel, E. E. (Dept. Pharmacol., Univ. Alberta, Edmonton, Canada). *Am. J. Physiol.* 226(4):749-755, 1974.

3598 PROSTAGLANDINS IN GASTROENTEROLOGY. *(Por.)* de Moraes, Jr., J. P. P. (Fac. Med., Univ. Sao Paulo, Brazil). *Arq. Gastroenterol.* 11(1):29-34, 1974.

3599 PORTACAVAL SHUNTS IN THE RAT. I. SURGICAL ANATOMY. *(It.)* Pettirossi, O.; di Pietrantonio, M.; Cherubini, M. (Inst. Clin. Gen. Surg. Ther., Surg. Univ. Trieste, Italy). *Policlinico (Chir.)* 80(1):41-47, 1973.

3600 INDUCTION OF SALIVARY GLAND TUMORS IN MONKEYS. *(Rus.)* Orzhonikidze, G. G. Res. Oncol., Min. Health, Georgian SSR, USSR). *Soobshch. Akad. Nauk Gruz. SSR* 73(2):485-487, 1974.

3601 EXPERIMENTAL STUDIES ON PREVENTING ADHESIONS WITH CHONDROITIN SULFATE IN ENTEROCOCCAL PERITONITIS. *(Ger.)* Sailer, R.; Stauch, G. (Surg. Clin., Univ. Dusseldorf, Germany). *Bruns Beitr. Klin. Chir.* 220(6):637-642, 1973.

3602 EFFECT OF THYROID-ADRENAL SYNERGISM IN DISORDERS OF LIPID METABOLISM INDUCED IN RATS BY ADMINISTRATION OF LARGE DOSES OF ETHANOL. *(Fr.)* Guilland, J. C.; Mounie, J.; Klepping, J.; Didier, J. P.; Bastien, H. (Fac. Med., Univ. Dijon, France). *C. R. Soc. Biol. (Paris)* 167(10):1413-1420, 1973.

3603 AGE-DEPENDENT REGULATION OF ISOPROTERENOL-STIMULATED DNA SYNTHESIS IN RAT SALIVARY GLAND IN VIVO. *(E.)* Roth, G. S.; Karoly, K.; Britton, V. J.; Adelman, R. C. (Temple Univ. Sch. Med., Philadelphia, Pa.). *Exp. Gerontol.* 9(1):1-11, 1974.

3604 ADENYLATE CYCLASE ACTIVITY IN RAT SUBMANDIBULAR GLAND DURING POSTNATAL DEVELOPMENT. *(E.)* Barka, T.; Van Der Noen, H. (Mount Sinai Sch. Med., New York, N.Y.). *Life Sci.* 14(2):267-280, 1974.

3605 MEASUREMENT OF HEPATIC BLOOD FLOW IN MAN. *(E.)* Bradley, III, E. L. (Emory Univ. Sch. Med., Atlanta, Ga.). *Surgery* 75(5):783-789, 1974.

3606 REINNERVATION OF THE DENERVATED PAROTID GLAND OF THE CAT. *(E.)* Ekstrom, J.; Emmelin, N. (Inst. Physiol., Univ. Lund, Sweden). *Q. J. Exp. Physiol.* 59(1):1-9, 1974.

607 SELECTIVE ELIMINATION OF ENTEROBACTERIACEAE
SPECIES FROM THE DIGESTIVE TRACT IN MICE
ND MONKEYS. *(E.)* van der Waaij, D.; Berghuis-De
ries, J. M. (Radiobiol. Inst. TNO, Rijswijk, Nether-
ands). *J. Hyg. (Camb.)* 72(2):205-212, 1974.

508 REGULATION OF ISOPROTERENOL-STIMULATED DNA
SYNTHESIS IN RAT SALIVARY GLAND IN VIVO BY
DRENAL GLUCOCORTICOIDS. *(E.)* Roth, G. S.; Karoly,
.; Adelman, A.; Adelman, R. C. (Temple Univ. Sch.
ed., Philadelphia, Pa.). *Exp. Gerontol.* 9(1):
3-26, 1974.

509 THE SECRETORY INNERVATION OF THE PAROTID GLAND OF THE CAT: AN UNEXPECTED COMPONENT. *(E.)* Ekstrom, J.; Emmelin, N. (Inst. Physiol., Univ. Lund, Sweden). *Q. J. Exp. Physiol.* 59(1): 11-17, 1974.

3610 PEROXIDASE AND AMYLASE ACTIVITY OF THE GUINEA PIG SUBMANDIBULAR GLAND DURING THE SECRETORY CYCLE. *(E.)* Bloom, G. D.; Carlsoo, B.; Danielsson, A.; Marklund, S.; Stigbrand, T. (Dept. Histology, Physiol. Chem., Univ. Umea, Sweden). *Histochemistry* 38(3):271-280, 1974.

See also, 3393, 3461, 3818.

DIAGNOSTIC PROCEDURES

3611 ENDOSCOPIC PANCREATOCHOLANGIOGRAPHY WITH SPECIAL REFERENCE TO MANOMETRIC METHOD.

(E.) Kasugai, T.; Kuno, N.; Kizu, M. (Aichi Cancer Ctr., Nagoya, Japan). *Med. J. Aust.* 2(15):717-725, 1973.

Of 496 patient endoscopic examinations, 451 (90.9%) cannulations were successfully performed, resulting in 251 endoscopic pancreatograms (EPG), 152 endoscopic pancreatocholangiograms (EPCG), and 48 endoscopic cholangiograms (ECG). The selected ducts were visualized in 83.3% of attempted cases. A manometer was developed to measure and control the injecting pressure of the contrast medium in EPCG. The total volume of injecting dye was 15-22 ml for EPCG, 10-20 ml for EPG, and over 15 ml for ECT. Eight cases of carcinoma of the head of the pancreas and 10 cases of pancreatic carcinoma located in the body and/or tail were diagnosed by EPCG. Chronic pancreatitis was classified into 3 groups: minimal, moderate, and advanced, according to a grading of findings in EPCG. In 157 cases of chronic pancreatitis, 68 showed minimal, 60 moderate, and 29 advanced stage of chronic pancreatitis. The criteria for EPCG diagnosis of chronic pancreatitis were evaluated by the study of postmortem pancreatograms and by histological investigation. A correlation between results for both investigations was demonstrated in 79% of normal findings and in all cases of chronic pancreatitis. Various diseases of the biliary systems were successfully confirmed by EPCG. This group included 3 cases of carcinoma of the gallbladder, 6 of carcinoma of the bile duct, some metastic liver tumors, and a liver abscess. It appears that EPCG is one of the most reliable procedures to detect diseases of the pancreatic and biliary systems, especially space-occupying lesions and also chronic inflammatory changes in the pancreas.

3612 THE DIAGNOSIS OF HEMOBILIA BY PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY. *(E.)*

Myers, R. N.; Haupt, G. J.; Birkhead, N. C. (Lankenau Hosp., Philadelphia, Pa.). *Am. J. Gastroenterol.* 60(5):510-512, 1973.

A case report is presented of a 26-yr-old man with traumatic hemobilia, correctly diagnosed preoperatively by percutaneous transhepatic cholangiography. This roentgenographic study showed numerous filling defects in the biliary ductal system and gallbladder which were interpreted as blood clots. There was also extravasation of dye from the biliary tree into an area of damaged liver parenchyma. These findings were confirmed at operation and a right hepatic lobectomy performed to resect all damaged hepatic tissue and control bleeding. The patient's recovery was uneventful. The technique for percutaneous cholangiography utilizes a lateral intercostal approach, with flexible Teflon tubing, gravity drainage of bile, and cinefluorographic monitoring and filming. Both roentgenograms and cinefluorograms were taken during filling of the biliary system and gallbladder with dye (50% sodium diatrizoate).

3613 SERIAL CARCINOEMBRYONIC ANTIGEN ASSAYS: USE IN DETECTION OF CANCER-RECURRENCE.

(E.) Sorokin, J. J.; Sugarbaker, P. H.; Zamcheck, N.; Pisick, M.; Kupchik, H. Z.; Moore, F. D. (Harvard Med. Sch., Boston, Mass.). *JAMA* 228(1):49-53, 1974.

A prospective study of 102 patients who had undergone potentially curative operations for colorectal cancer was undertaken to correlate serial carcinoembryonic antigen levels with the clinical course. When included in this study, patients selected had no detectable metastatic or recurrent disease. Twelve patients developed sustained elevations in their carcinoembryonic antigen levels greater than 2.5 ng/ml. Six of these had progressively rising carcinoembryonic antigen titers, and all developed subsequently recurrent cancer; rising carcinoembryonic antigen levels were observed up to 29 months before cancer recurrence was clinically detected. The 6 with "stable" elevations and 6 with transient elevations developed no clinically detectable cancer. Eighty-four patients with carcinoembryonic antigen levels consistently under 2.5 ng/ml had no evidence of recurrent neoplasms. Two developed second primaries. Serial carcinoembryonic assays postoperatively help detect recurrent colon cancer in asymptomatic patients.

3614 PAEDIATRIC OESOPHAGEAL MANOMETRY. *(E.)*

Chappell, J. S.; Bremner, C. G. (Baragwanath Hosp., Johannesburg, South Africa). *S. Afr. Med. J.* 40(3):1875-1877, 1974.

The lower esophageal sphincter was studied manometrically in 18 babies aged 1 day to 9 months. Ten babies were normal and 8 had feeding problems with vomiting and regurgitation. The lower esophageal sphincter in newborns was 0.5-1 cm in length; in all babies it was placed at or below the effective diaphragmatic hiatus at rest. The mean sphincter pressure in normal babies was 8 mm Hg and the mean fundo-esophageal gradient was 9 mm Hg. In 3 abnormal babie the mean sphincter pressure was 5 mm Hg and the mean fundo-esophageal gradient was 7 mm Hg. Of these grou 1 had a hiatus hernia, 1 a definite chalasia, and 1 intermittent vomiting. The remaining 5 abnormal babies had a mean sphincter pressure of 18 mm Hg and a mean fundo-esophageal gradient of 11 mm Hg. This group included 1 patient with hypertrophic pyloric stenosis, 1 with cerebral palsy with pharyngeal and esophageal incoordination, and 3 persistent vomiters. The results indicate the value of pressure tracings of the lower esophagus in the evaluation of patients with persistent vomiting of a functional nature.

3615 ENDOSCOPIC DIAGNOSIS OF PRIMARY CARCINOMA OF THE SMALL INTESTINE. *(E.)*

Seifert, E.; Wagner, H. H.; Reichel, K.; Braschke, M.; Ostertag, H. (Med. Coll., Hannover, Germany). *Am. J. Gastroenterol.* 61(1):15-21, 1974.

In a male patient, aged 47, who presented with melena of 8 months' duration and of uncertain origin, x-ray examination suggested a malignant tumor with fistulas at the duodenojejunal flexure. Duodenoscopy with a fiberoptic system and selective biopsy established the diagnosis of an adenocarcinoma pri-

to surgery. In the case of a man, aged 62, who
l complained of nonspecific pains in the epigas-
ium for 2.5 yr and presented with severe anemia
r 3 months, duodenoscopy with a fiberoptic system
l biopsy, carried out because a lesion was sus-
cted on x-ray examination, demonstrated an adeno-
rcinoma in the *pars horizontalis* inferior of the
odenum. Radical surgery was possible in both
ses. In each, the indication for surgery was
finitely given by preoperative endoscopy and biopsy
ndings. It is concluded that duodenoscopy with
lective biopsy is the surest method of diagnosing
mors of the small intestine.

6 ANGIOGRAPHIC DIAGNOSIS OF LEIOMYOMATOUS
SMALL BOWEL TUMORS. *(E.)* Itzchak, Y.;
ar, R.; Mozes, M.; Deutsch, V. (Tel-Aviv Univ.
l. Sch., Israel). *Angiologica* 10(5-6):310-317,
73.

e angiographic features of leiomyomatous tumors
the small bowel are described in 3 cases (3 wo-
n, aged 34-66 yr). Selective celiac and superior-
senteric angiography disclose large, sometimes
ltiple, feeding arteries and draining veins.
ere are many irregular tumor vessels and dense
aining, venous pooling and early venous filling.
e margins are well circumscribed and correspond
the true size of the mass. The angiographic
fferential diagnosis between benign and malignant
iomyomatous tumors present considerable difficul-
es. The vascular pattern is similar. Demonstra-
on of more than one mass within the bowel wall
es not indicate malignancy, as multiple benign
sions may occur. If the lesion is larger than
cm in diameter, it is likely to be malignant.
wever, one of the 3 cases demonstrates that this
iterion is not absolute.

17 THE ANGIOGRAPHIC APPEARANCE OF GASTROIN-
TESTINAL CARCINOIDS. *(Ger.)* Vesin, S.;
nova, A. (Reg. Hosp., Prague-Bulovka, Czechoslo-
kia). *Fortschr. Geb. Roentgenstr. Nuklearmed.*
)(1):23-31, 1974.

66-yr-old man with a history of flush, diarrhea,
ight loss, and edema of the lower extremities pre-
nted with hepatomegaly, myogenic enlargement of
e heart, and arteriosclerosis. X-ray examination
the gastrointestinal tract showed a filling defect
cm in diameter at the ileocecal valve, circular
traction of the cecum, and displacement of the
omach and colon by the enlarged liver. Selective
giography of the superior mesenteric artery re-
aled a dilatation of the peripheral ileocecal
tery which opened into a network of tortuous arch-
ke or radiating arteries surrounding a highly
scularized structure measuring 4 x 6 cm. The con-
ast medium collected at the center of this struc-
re. An anomalous reaction occurred when 20 μg
repinephrine were injected intraarterially:
ood vessels constricted in the region of the tumor.
surgery a carcinoid was found which had infil-
ated the abdominal wall and metastasized into the
ver. A 51-yr-old woman who had received conser-
tive treatment for what appeared to be biliary disease was found to have many nodular hepatic metastases from a carcinoid at laparotomy. An attempt to locate the primary tumor by selective angiography of the superior mesenteric and celiac arteries was unsuccessful although the hepatic metastases were visible. At autopsy, performed 6 months later, 3 primary tumors measuring from 5.7 to 8 mm in diameter, were located in the intestinal submucosa 25-75 cm from the ileocecal valve. The presence of hepatic metastases was confirmed, and a few metastases were also detected in the mesenteric lymph nodes. Other findings included carcinoid fibrosis of the tricuspid and pulmonary valves of the heart, hypertrophic dilatation of the right side of the heart, and chronic peripheral venostasis. The failure to detect the primary tumors by angiography is attributed to their small size.

3618 NORMAL PYLORIC SPHINCTER COMPETENCE EVALUATION AS BASED ON 148 T-TUBE CHOLANGIOGRAMS. *(E.)* Feinberg. S. B.; Delaney, J. P. (Univ. Minnesota Hosps., Minneapolis). *Am. J. Gastroenterol.* 61(1):53-54, 1974.

The postoperative T-tube cholangiograms from 1964-1970 at the University of Minnesota Hospitals were reviewed. The cases included were free of gastric or duodenal pathology. In addition, those included had patent biliary trees, free spill into the duodenum as well as retrograde duodenal fill. The technique used is that of a gentle, slow hand injection of the water-soluble iodides in common use for i.v. pyelograms during those years. The injection is begun in the supine position with attention first directed to ampullary patency and free spill. Immediately thereafter, the patient is placed as steeply to the left, right, and anterolaterally as well as in the Trendelenburg position as might be needed to fill all primary radicals. The volume of contrast injected is limited to that required to fill the biliary tree and duodenum. All attempts are made to obviate ampullary spasm and pain. A total of 116 patients were studied who had a combined total of 148 postoperative cholangiograms. Of the 148, only 2 showed retrograde fill of the stomach. It is concluded that pyloric reflux is abnormal and not a physiologic variant.

3619 DETECTION OF CARCINOEMBRYONIC ANTIGEN IN FECES FOR THE DIAGNOSIS OF COLONIC RECTAL CANCERS. *(E.)* Hara, M.; Watanabe, S.; Kitagawa, M.; Yasutomi, M. (Osaka Univ. Hosp., Japan). *Am. J. Proctol.* 25(2):67-76, 1974.

Antisera for carcinoembryonic antigen were prepared by immunizing rabbits and guinea pigs with 0.6 M percholoric acid extracts from a colon adenocarcinoma and by absorbing each antiserum with normal colon homogenate, normal liver homogenate, perchloric acid extracts of normal spleen, and pooled human plasma. The rabbit and guinea pig antisera reacted not only with perchloric acid extracts of adenocarcinoma but also with extracts from normal as well as malignant feces. However, after absorption with fecal perchloric acid extracts, only guinea pig antiserum reacted with perchloric acid extracts from rectal and colonic carcinoma. Thus, it seems that tumor antigen preparation extracted from a colon adenocarcinoma contains cancer specific determinant and fecal determinant.

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To establish the location of active gastrointestinal bleeding with greater certainty, fiberoptic esophagogastroduodenoscopy was employed using ultraviolet light and i.v. fluorescein. A total of 39 examinations was conducted on 35 patients. Each patient presented with acute upper gastrointestinal bleeding of unknown etiology and site when first seen. Of the 39 examinations, active bleeding manifested by clear visualization of blood emanating from a definitive lesion, or by a collection of fresh unclotted blood, was observed in 16 examinations by conventional endoscopy using white light. Ultraviolet endoscopy, by comparison, disclosed fluorescence indicative of free bleeding or oozing in 33 examinations. In 16 of the examinations, a single definitive lesion was detected on endoscopy; active bleeding was observed in 9 of these examinations by conventional endoscopy and in 13 by ultraviolet endoscopy. Multiple lesions were found in 22 of the examinations; free bleeding was detected in 7 of the latter by conventional endoscopy and in 19 by ultraviolet endoscopy. Ultraviolet endoscopy using i.v. fluorescein as a fluorescent marker provides diagnostic assistance in the problem of upper gastrointestinal bleeding by: 1) demonstration of active bleeding or continued oozing not obvious by conventional endoscopy using white light; 2) delineating the anatomical area of bleeding, if not the actual responsible lesion when these have not been clearly identified by ordinary examination; and 3) distinguishing which of several potential bleeding lesions is actively bleeding.

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See also, 3680, 3684, 3882, 3938, 3955, 3958, 4051.

GASTROINTESTINAL DISEASES

ESOPHAGUS

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ie effect of dilute corrosive drain cleaners (less ian 10% concentration) on the esophagus was studied i thoracotomized mongrel cats. Sulfuric acid (9%), otassium hydroxide (8%), and sodium hydroxide (8.3%) il produced gross and microscopic evidence of severe image after 30-sec exposure. Sulfuric acid resulted i the most impressive gross injury. The burned muosa changed from pink to a white plaque-like discolortion along with wrinkling of the mucosa indicating nooth muscle spasm. Extensive coagulation was noted icroscopically. Potassium hydroxide produced marked ythematous injury with underlying muscle spasm. ie microscopic injury was complete liquefaction of ie mucosa with edema formation and mild inflammaion in the underlying muscularis mucosa and submucoil advential layers. Sodium hydroxide produced estruction of the superficial layer of squamous ucosa along with submucosal and transmural thrombois in blood vessels. The inflammatory response was ost marked with this product. It is suggested that resently allowable concentrations of these agents hould be banned. Clinical data on accidental injury n children indicate that child-proof packaging will ot afford much protection.

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3697 PEPTIC ESOPHAGITIS AND PRECANCEROUS DYSPLASIA: ONE CASE. *(Fr.)* Lagadec, B.; Branche, D.; Conte-Marty, J.; Naudin, G. (Deaconess Hosp., Paris, France). *Sem. Hop. Paris* 50(18): 1189-1192, 1974.

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3699 CLINICAL IMPORTANCE OF HIATUS HERNIA. *(Ger.)* Pätzold, K. (Reg. Hosp., Dresden-Friedrichstaat, Germany). *Z. Gesamte Inn. Med.* 29(7):288-290, 1974.

3700 ESOPHAGEAL DISORDERS AND THEIR RELATION TO THE RESULTS OF THE PERFUSION TEST AND HISTOLOGICAL FINDINGS IN THE ESOPHAGEAL MUCOSA. *(Ger.)* Brügmann, E.; Hauzeur, F. (Clin. Internal Med., Univ. Rostock, Germany). *Z. Gesamte Inn. Med.* 29(7): 291-293, 1974.

3701 ENDOBRACHYESOPHAGUS AND ACQUIRED BRACHYESOPHAGUS. *(Ger.)* Rossetti, M.; von Huben, R.; Allgower, M. (Dept. Surg., Univ. Basel, Switzerland). *Helv. Chir. Acta* 41(1/2):109-113, 1974.

3702 GASTRO-OESOPHAGEAL REFLUX AND HIATUS HERNIA -- ENDOSCOPY. *(E.)* Roesch, W. (Dept. Med., Univ. Erlangen-Nuremberg, Germany). *Postgrad. Med. J.* 50(582):199-201, 1974.

3703 THE MEDICAL MANAGEMENT OF HIATUS HERNIA. *(E.)* Avery-Jones, F. (Central Middlesex Hosp., London, England). *Postgrad. Med. J.* 50(582): 203-204, 1974.

3704 ROENTGENOGRAPHIC APPEARANCE OF THE DISTAL ESOPHAGUS AND THE STOMACH AFTER HIATAL HERNIA REPAIR. *(E.)* Teixidor, H. S.; Evans, J. A. (Cornell Univ. Med. Coll., New York, N.Y.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 119(2): 245-258, 1973.

3705 ESOPHAGEAL STENOSIS FOLLOWING AGRANULOCYTOSIS COMPLICATED BY ESOPHAGITIS. *(Rus.)* Rusanova, N. I. (Leningrad Pediatr. Med. Inst., USSR). *Vestn. Khir.* 111(7):127-128, 1973.

3706 THE SIGNIFICANCE AND DIFFERENTIAL DIAGNOSIS OF BENIGN ANNULAR STRICTURES IN X-RAYS OF THE DISTAL ESOPHAGUS. *(Ger.)* Heitmann, P.; Dombrowski, H. (Med. Clin., Univ. Marburg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1434-1435, 1972.

3707 RARE CAUSE OF OBSTRUCTION IN AN ARTIFICIAL ESOPHAGUS MADE OF SMALL INTESTINE. *(Rus.)* Portnoi, M. V.; Tsarev, N. I. (no affil.). *Vestn. Khir.* 111(7):130-131, 1973.

3708 HERPETIC ESOPHAGITIS. A COMMON CAUSE OF ESOPHAGEAL ULCERATION. *(E.)* Nash, G.; Ross, J. S. (Harvard Med. Sch., Boston, Mass.). *Hum. Pathol.* 5(3):339-346, 1974.

3709 SOIL pH, RAINFALL AND DEATH RATES FOR OESOPHAGEAL CANCER IN CHILEANS. *(E.)* Zaldivar, R.; Robinson, H. (Univ. Tennessee Coll. Med., Memphis). *Beitr. Pathol.* 151(3):317-321, 1974.

3710 CLINICAL MANAGEMENT OF HIATUS HERNIAS AND GASTROESOPHAGEAL REFLUX. *(E.)* Ottinger,

, W. (Massachusetts Gen. Hosp., Boston). *Surg.* *lin. North Am.* 54(3):475-488, 1974.

See also, 3614, 3620, 3671, 4114.

STOMACH

711 SIMIAN GASTROPATHY WITH SUBMUCOSAL GLANDS AND CYSTS: GASTRITIS GLANDULARIS OR CYSTI- PROFUNDA? *(E.)* Scotti, T. M. (Primate Pesticide ffects Lab., Research Triangle Park, N.C.). *Arch. thol.* 96(6):403-408, 1973.

unusual gastropathy with submucosal glands and sts, usually associated with mucus-secreting cell perplasia of the mucosa, was observed at autopsy 11 (52%) of 21 rhesus monkeys (*Macaca mulatta*), t in none of 9 squirrel monkeys (*Saimiri sciureus*). most instances, the gastric lesion occurred spon- neously, in contrast to similar lesions in monkeys the genus *Macaca* reported by other investigators, ich usually were attributed to known exposure to ritants. These lesions, characterized by promi- nt changes in the mucosa, including epithelial perplasia, and penetration of the mucosal epithe- ium into the submucosa, with formation of epithelial sts, were usually noted in animals exposed to poly- lorinated biphenyls (PCB) or triphenyls (PCT), iesel lubricating oil, and an intragastric parasitic ematode, *Nochtia nochti*. The amount and degree of nvasiveness of the submucosal epithelium were pro- ounced in 4 rhesus monkeys, moderate in 3, and slight 4. Of the 4 monkeys with pronounced submucosal in- olvement, 1 had received low-level doses of heptachlor .01 mg/kg p.o.) daily for 36 months and 1 had been ed high levels of PCB (500-2000 ppm/day) in the diet or 77 days prior to death. The 3rd monkey had received nly 1 p.o. dose of parathion (13 mg) 1 yr prior to death, hile the 4th monkey was without experimental exposure PBC or pesticides. No gastric lesions were found 2 rhesus monkeys that had low-level p.o. dose of DDT .5 mg/kg/day for 50 months) or parathion (0.3 g/kg/day for 52 months). No gastric disease of any ype was found in squirrel monkeys, including 3 given ow-level p.o. doses of pesticides (lindane, carbaryl, nd 2,4-D) and 1 fed high levels of PCB in the diet. hese lesions resemble observed gastropathy in man eported as diffuse heterotopic cystic malformation nd is analogous to colitis cystica profunda in man.

712 INDEPENDENT BEHAVIOUR OF BLOOD GROUP A- AND B-LIKE ACTIVITIES IN GASTRIC CARCINO- ATA OF BLOOD GROUP AB INDIVIDUALS. *(E.)* Denk, .; Tappeiner, G.; Holzner, J. H. (Sch. Med., niv. Vienna, Austria). *Nature* 248(5447):428- 30, 1974.

ive specimens of surgically removed gastric carcin- mata from patients with the blood group A_1B were tudied and independent behavior of the A and the B pecificity in 4 of them in certain areas of the malignant growth was observed. Histologically the tumors showed a variety of patterns from rather well-differentiated adenocarcinoma to anaplastic globocellular growth. Signet ring cells were present in 2 carcinomas. The normal superficial as well as the intestinal metaplastic mucosa were rich in both BG-A and BG-B in all of the 5 cases in a distribution typical for secretors. The endothelial cells of the blood vessels and the erythrocytes in the normal tissue as well as within the carcinoma were positive with respect to BG-A and BG-B in every case. No relationship between the presence of blood group substances and the histological degree of differentiation was observed in the cases and different distribution patterns of BG-A and -B activities were observed even in morphologically identical areas. Carcinoembryonic antigen was postulated to result from defective synthesis of blood group substances in gastrointestinal carcinomata due to genetic defects. α-N-acetyl-D-galactosaminyl transferase and α-D-galactosyl transferase, respectively, that attach the appropriate sugars in 1 → 3 linkage to the β-galactosyl unit in an H-active structure depend upon intact A and B genes, respectively. Since these transferases have identical acceptor substrate requirements the selective loss of either BG-A or BG-B is most likely to be due to deletion or repression of the corresponding gene in the ABO locus.

3713 EFFECT OF CARBENOXOLONE SODIUM ON ASPIRIN-INDUCED INJURY OF THE RAT GASTRIC MUCOSA. Yeomans, N. D.; St. John, D. J. B. (Alfred Hosp., Melbourne, Australia). *Am. J. Dig. Dis.* 19 (3):217-222, 1974.

Investigations were performed in male Sprague-Dawley rats to examine the effect of carbenoxolone sodium on aspirin-induced gastric mucosal injury. Mucosal damage was quantitated histologically in the body of the stomach (corpus) after a single dose of aspirin and after 2 weeks of daily aspirin. Over dosage ranges of 2-30 mg/kg/day of carbenoxolone and 10-120 mg/kg of aspirin, carbenoxolone treatment conferred no protection, despite evidence of a significant carbenoxolone effect on gastric mucus. This contrasts with the known protective action of carbenoxolone against injury by restraint stress and corticosteroids, and it is likely that these findings reflect such differences in pathogenesis.

3714 MANAGEMENT OF GASTRIC LYMPHOMAS. *(E.)* Connors, J.; Wise, L. (Washington Univ.

Sch. Med., St. Louis, Mo.). *Am. J. Surg.* 127(1): 102-108, 1974.

Between 1950 and 1970, 74 patients with primary gastric lymphoma were treated; these included 41 patients with lymphosarcoma, 29 with reticulum cell sarcoma, and 4 with Hodgkin's disease. The mean age was 61. The disease was more common in men; there were 28 women and 46 men. The 2 most common clinical features were pain and weight loss. The pain was often similar to that of peptic ulcer disease, localized to the epigastrium and relieved by ingestion of food and antacids. A gastric tumor was demonstrated in 49 patients, an ulcerating lesion in 8, and diffuse gastric involvement in 3. Of the 74 patients, 66 underwent exploration. Of the 66 patients who underwent exploration, in 38 the lesion was resected, but in 28 the lesion was unresectable. The rate of resectability in the patients who underwent operation was 57%; the total resectability rate for lymphosarcoma was 46%, for reticulum cell sarcoma 58%, and for Hodgkin's disease 50%. Twenty had perigastric nodal metastases and 18 did not. Patients with lymphosarcoma had a better prognosis than did those with reticulum cell sarcoma. In patients with resectable lesions the average tumor dose was 3,260 rads. Of the patients with gastrectomy and negative perigastric nodes, 5 received radiotherapy and 3 survived 5 years; 13 patients did not receive radiotherapy and 7 lived 5 years. Of the patients with gastrectomy and positive perigastric nodes, 6 received radiotherapy and 2 survived 5 years; 2 others are alive, however, at 33 and 48 months without evidence of residual disease. Fourteen patients with positive nodes did not receive radiotherapy and 3 survived 5 years. Twenty-eight patients had lesions that were considered unresectable. The average survival in this group was 10.9 months. Twenty-one of these patients received radiotherapy, with a mean tumor dose of 2,980 rads. The average survival in these patients was 13.3 months. Ten patients had extensive lesions requiring total gastrectomy. Four survived 5 years; 3 of these received from 2,500 to 3,500 rads postoperatively. A fifth patient is alive and well at 17 months. The operative mortality was 30% in this group. It is concluded that the diagnosis of primary gastric lymphoma should always be considered in the differential diagnosis of gastric lesions.

3715 URINARY PEPSINOGEN ZYMOGRAM IN GASTRECTOMIZED PATIENTS: WHAT IS THE SOURCE OF THESE PROTEASES?

(E.) Mangla, J. C.; Kim, Y. (Monroe Community Hosp., Rochester, N.Y.). *Am. J. Dig. Dis.* 19(3):211-215, 1974.

Urinary proteolytic activity and agar gel electrophoresis was done 3 months after complete gastrectomy in 7 patients, and the findings compared with those in 25 presumably normal subjects. It was found that 6 of the 7 gastrectomized patients showed proteolytic activity in the urine and that this enzymatic activity appears as 2 or 3 bands on agar gel electrophoresis. The origin of the urinary pepsinogens found in patients with complete gastrectomy, who are reputed not to have such activity, remains an enigma. The possible exaplanations are as follows: 1) Protease activity may originate from the duodenum, jejunum, esophagus, or seminal vesicles. 2) The pepsinogens may have arisen from ectopic gastric mucosa. 3) Liver, spleen, and many other tissues are supposed to produce cathepsin, but cathepsin is not excreted in the urine and was not seen in these cases. 4) Gastrectomy may not have been complete even though care was taken to select only those patients in which proximal and distal portions of excised stomach showed esophagus and duodenum, respectively. The presence of pepsinogen activity, however small, in gastrectomized patients as shown by this study would appear to be one reason why there is no correlation between peptic ulcer and uropepsin activity.

3716 IN VITRO DETERMINATION OF THE SENSITIVITY OF STOMACH CANCER TO 5-FLUOROURACIL.

(Rus. Savran, V. R. (L'vov Med. Inst., USSR). *Vrach. Delo* (1):80-82, 1974.

In vitro tests for sensitivity to 5-fluorouracil were performed on tumors removed from 105 patients (64 men and 41 women) with stomach cancer. After removin fat, connective tissue, and necrotic areas, tissue was incubated in tubes containing Ringer-Locke's solution (controls) or 5-fluorouracil (2.5 and 5 mg/ml) at 37 C for 24 hr. Then 3 ml of an indicator solution was added to detect dehydrogenase activity. This solution contained 1% agar in 1/15 M pH 7.2 phosphate buffer, 0.4% glucose, and methylene blue (1:30,000). Tubes were incubated at 37 C until the solution became colorless. Of 105 tumors, 38 showed *in vitro* sensitivity to 5-fluorouracil. The most sensitive tumors were those located in the antrum (20 of 52 or 38.5%) and the corpus (3 of 10); only 1 of 5 tumors in the cardia was sensitive to 5-fluorouracil. No difference was found between the sensitivity of exophytic tumors (15 of 37 or 40.5%) and infiltrating tumors (20 of 54 or 37%); only 3 of 14 (21.4%) ulcerated tumors were sensitive. Adenocarcinomas were sensitive in 28 of 75 cases (37.3%) and scirrhous carcinomas in 5 of 14 cases (35.7%). All 7 colloid carcinomas were resistant to 5-fluorouracil. Since most patients were treated surgically, it was possible to compare the results of the *in vitro* test with the results of chemotherapy in only 26 patients. Administration of 5-fluorouracil (15 mg/kg i.v. every 48 hr) had no effect on 18 tumors which were resistant to this agent in the *in vitro* test. Tumor regression occurred in 4 of the 8 remaining patients, while no response was obtained in the other 4 patients.

3717 SOME UNUSUAL ROENTGENOLOGIC FINDINGS ASSOCIATED WITH MARKED GASTRIC DILATATION.

(E.) Joffe, N. (Beth Israel Hosp., Boston, Mass.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 119(2): 291-299, 1973.

3718 PHYTOBEZOAR FORMATION AND FOOD BOLI FOLLOWING GASTRIC SURGERY.

(E.) Rogers, L. F.; Davis, E. K.; Harle, T. S. (Univ. Texas Med. Sch., Houston). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 119(2):280-290, 1973.

9 ON HETEROORGANIC ANTIGENS OF HUMAN GASTRIC CANCER. *(Rus.)* Avdeev, G. I. (P. A. Hert- Res. Inst. Oncol., Moscow, USSR). *Vopr. Onkol.* 2):36-40, 1974.

20 EOSINOPHILIC GRANULOMA OF STOMACH: TWO CASE REPORTS. *(E.)* Neibling, H. A. (no il.). *Am. Surg.* 40(5):305-308, 1974.

21 MULTIPLE POLYPOID CYSTIC GASTRITIS IN OLD GASTROENTERIC STOMA. *(E.)* Griffel, B.; leberg, M.; Reiss, R. (Meir Hosp., Kfar Saba, ael). *Arch. Pathol.* 97(5):316-318, 1974.

22 A SURVIVAL STUDY OF INTESTINAL AND DIFFUSE TYPES OF GASTRIC CARCINOMA. *(E.)* emmermann, G. N.; Brown, C. (Kuakini Hosp., olulu, Hawaii). *Cancer* 33(4):1190-1195, 1974.

23 SELECTIVE PROXIMAL VAGOTOMY AND DETERMINATION OF THE EDGE OF THE ANTRUM. *(Ger.)* erhard, P.; Pedrinis, E. (Inselspital, Bern, itzerland). *Helv. Chir. Acta* 41(1/2):139-141, 1974.

24 EXTENSION OF FUNDAL GASTRITIS STUDIED BY ENDOSCOPIC CONGO RED TEST. *(E.)* Tatsuta, ; Saegusa, T.; Okuda, S. (Ctr. Adult Dis., Osaka pan). *Endoscopy* 6(1):20-26, 1974.

25 PRACTICAL VALUE OF DETERMINING URINARY PORPHYRIN IN GASTRECTOMIZED PATIENTS. *us.)* Khoroshukhina, S. M. (Central Inst. Hematol. ood Transfusions, Moscow, USSR). *Lab. Delo* (8): 9, 1973.

26 HYPERTROPHIC PYLORIC STENOSIS. *(Ger.)* Hartl, H. (Provincial Pediatr. Hosp., nz, Austria). *Med. Klin.* 68(41):1320-1322, 1973.

27 THE GASTROSCOPIC EXAMINATION OF ATTAPULGITE, A COLLOIDAL SILICATE WITH ANT- ID EFFECT. *(Ger.)* Gobel, D.; Witte, S. (Deaco- ss Hosp., Karlsruhe-Ruppurr, Germany). *Med. Klin.* (41):1323-1326, 1973.

28 PROTEOLYTIC FUNCTION OF THE STOMACH IN CHRONIC GASTRITIS, MANIFEST DISEASE, AND NCTIONAL DISORDERS IN GASTRIC SECRETION AND TILITY IN CHILDREN. *(Ukr.)* Bilousov, Iu. V. krainian Inst. Postgrad. Med., USSR). *Pediatr. ush. Ginekol.* 35(5):6-8, 1973.

29 COMPARISON OF GASTROCAMERA AND RADIOLOGICAL EXAMINATIONS IN GASTRIC CANDIDIASIS. *(Ger.)* rtelmess, R.; Kunz, O. (Munic. Hosp., Munchen- erfohring, Germany). *Radiologe* 13(9):388-393, 73.

3730 CLINICAL FINDINGS IN VITAMIN B_{12} DEFICIENCY FOLLOWING PARTIAL GASTRECTOMY. *(Ger.)* Spatz, R.; Schlichting, I.; Troidl, H. (2nd Med. Clin., Univ. Munich, Germany). *Med. Welt* 24(39): 1470-1472, 1973.

3731 DIVERTICULUM OF THE UPPER PART OF THE STOMACH. *(Ger.)* Wesseling, B.; Schutz, J. (Radiol. Clin., Westphalian Wilhelms Univ., Munster, Germany). *Med. Welt* 24(39):1476-1478, 1973.

3732 INTERSTITIAL GASTRIC EMPHYSEMA: A CASE REPORT. *(E.)* Harned, R. K.; Melamed, A. (Univ. Nebraska Sch. Med., Omaha). *Nebr. Med. J.* 59(4):98-102, 1974.

3733 ENDOSCOPIC REMOVAL OF GASTRIC OR DUODENAL POLYPS. *(Fr.)* Moulinier, B.; Grenier-Boley, P.; de Oliveira, C.; Ruet, D.; Lambert, R. (Edouard Herriot Hosp., Lyon, France). *Nouv. Presse Med.* 3(12):740-742, 1974.

3734 FALSE RADIOLOGICAL IMAGE OF A TUMOR IN THE GASTRIC FUNDUS. *(Fr.)* Vayre, P.; Bourdais, J. P.; Marie, L. (Vaugirard Hosp., Paris, France). *Sem. Hop. Paris* 50(18):1193-1194, 1974.

3735 ULCERATED SCHWANNOMA OF THE GASTRIC FUNDUS. *(Fr.)* Mehaut, M.; Sidibe-Cheik, R.; Muloway-Disashi. (Corvisart Hosp., Charleville-Mezieres, France). *Sem. Hop. Paris* 50(18):1198-1199, 1974.

3736 MUCOEROSIVE CARCINOMA (STAGE I). EARLY DIAGNOSIS BY ENDOSCOPICALLY CONTROLLED GASTRIC BIOPSY. *(Fr.)* Debray, C.; Martin, E.; Marche, C.; Richard, J.; Moreaux, J. (Bichat Hosp., Paris, France). *Sem. Hop. Paris* 50(18):1200-1202, 1974.

3737 LYMPHOCYTIC LYMPHOSARCOMA OF THE STOMACH. *(Fr.)* Vayre, P.; Debbasch, L.; Delavierre, P.; Biabaud, H.; Carnot, F. (Vaugirard Hosp., Paris, France). *Sem. Hop. Paris* 50(18):1206-1207, 1974.

3738 ADAPTATION SYSTEMS IN PATIENTS WITH GASTRIC CANCER DURING OPERATIONS UNDER NEUROLEPTANALGESIA. *(Rus.)* Agaev, I. N. (Res. Inst. Roentgenology, Radiology, Oncology, Baku, USSR). *Vopr. Onkol.* 20(1):20-25, 1974.

3739 CLINICO-BIOCHEMICAL FINDINGS IN CANCER OF THE GASTRIC STUMP. *(Rus.)* Aitakov, E. N.; Gulevich, T. A.; Orlov, A. A. (N. N. Pirogov Med. Inst., Moscow, USSR). *Vopr. Onkol.* 20(1):25-29, 1974.

3740 CLINICAL FEATURES, DIAGNOSIS AND TREATMENT OF BENIGN GASTRIC TUMORS. *(Rus.)* Papis, E. I. (Dnestrovsk City Hosp., USSR). *Vopr. Onkol.* 20(1):87-91, 1974.

3741 METASTASIS OF STOMACH CANCER INTO THE OVARIES. *(Rus.)* Radionchenko, A. A.; Bogemskaia, I. A. (Tomsk Med. Inst., USSR). *Vopr. Onkol.* 20(1):95-97, 1974.

3742 REACTION OF PERIPHERAL LYMPHOCYTES WITH PHYTOHEMAGGLUTININ (PHA) IN PATIENTS WITH STOMACH CANCER AND NONTUMOROUS GASTROINTESTINAL DISEASES. *(Rus.)* Kurtenkov, O. A. (Inst. Exp. Clin. Med., Ministry Health Estonian SSR, USSR). *Vopr. Onkol.* 20(1):101-102, 1974.

3743 PYLORIC STENOSIS IN AN EIGHT MONTH OLD CHILD. *(Ger.)* Gysler, R.; Kundert, J. G. (Eastern Switzerland Hosp. Infants Children, St. Gallen). *Z. Kinderchir.* 13(2):263-267, 1973.

3744 SPONTANEOUS PERFORATION OF THE STOMACH IN THE NEWBORN. *(Ger.)* Kaiser, G. (Inselspital, Bern, Switzerland). *Z. Kinderchir.* 13(3):314-321, 1973.

3745 GASTRIC ACID SECRETION IN RELATION TO GROSS TYPE OF GASTRIC CANCER. *(E.)* Kobayashi, S.; Kizu, M.; Kasugai, T. (Aichi Cancer Ctr. Hosp., Japan). *Am. J. Gastroenterol.* 60(4):366-371, 1973.

3746 THE SIGNIFICANCE OF DUODENOGASTRIC REFLUX. *(Ger.)* Schwamberger, K.; Reissigl, H.; Falser, N.(Gastroenterol. Lab., Univ. Innsbruck Austria). *Munch. Med. Wochenschr.* 116(17):895-896, 1974.

3747 PRIMARY HYPERTROPHIC PYLORIC STENOSIS IN ADULTS. A CLINICAL CONTRIBUTION. *(E.)* Manenti, V.; Ravelli, A. (Hosp. Circolo, Merate, Italy). *Chir. Gastroenterol.* 7(4):470-482, 1973.

3748 ORAL GLUCOSE TOLERANCE FOLLOWING SELECTIVE PROXIMAL VAGOTOMY ASSOCIATED WITH PYLOROPLASTY. *(Ger.)* Bauer, H.; Bruckner, W. L.; Welsch, K. H. (Surg. Polyclin., Univ. Munich, Germany). *Munch. Med. Wochenschr.* 116(18):929-932, 1974.

See also, 3430, 3449, 3451, 3618, 3620, 3647, 3649, 3651, 3656, 3704, 3805, 3819, 3847, 4123.

STOMACH

Peptic Ulcers

3749 DUODENAL ULCER IN THE RAT. *(E.)* Kowalewski, K. (Surg.-Med. Res. Inst., Univ. Alberta, Edmonton, Canada). *Lab. Anim. Sci.* 24(1): 39-42, 1974.

Male adult rats with permanent gastric cannulas were infused i.v. for 24 hours with pentagastrin and the cholinergic drug bethanechol chloride, administered separately or combined. In the first series of rats, gastric cannulas were opened and 24 hour secretions were collected during stimulation. In the second series of rats, similarly treated, the gastric cannulas were closed and the juice permitted to flow over the duodenal mucosa. In the third series, rats were infused intragastrically with exogenous gastric juice from a juice pool obtained from rats treated for 24 hours with pentagastrin and the cholinergic drug bethanechol chloride. Duodenal ulcers occurred only in the series of animals with gastric cannulas closed and in rats infused intragastrically with exogenous hydrogen ion-rich juice. It appears that the rat can develop duodenal ulcer if there is sustained exposure of the duodenal mucosa to hyperacidic, voluminous gastric secretion.

3750 BACK DIFFUSION OF HYDROGEN IONS ACROSS GASTRIC MUCOSA OF PATIENTS WITH GASTRIC ULCER AND RHEUMATOID ARTHRITIS. *(E.)* Ivey, K. J.; Clifton, J. A. (Roy. Prince Alfred Hosp., Sydney, Australia). *Br. Med. J.* 1(5896):16-19, 1974.

Ionic permeability of the gastric mucosa was measured in 6 patients with an acute exacerbation of severe generalized rheumatoid arthritis receiving either aspirin and prednisone or aspirin and indomethacin as therapy. The results were compared with those in 4 patients with benign gastric ulcer and 9 normal subjects. Compared with controls, H^+ concentration was decreased and Na^+ concentration increased while corrected H^+ flux out of the lumen and Na^+ flux into the lumen were significantly increased in the patient groups, indicating increased mucosal permeability. Abnormality of the gastric mucosal barrier persisted in 2 patients despite healing of their ulcers. Mucosal permeability of patients with rheumatoid arthritis and gastric ulcer did not differ significantly from one another. One rheumatoid patient with a gastric ulcer showed no difference in mucosal permeability to that of the other rheumatoid patients.

e studies suggest that increased H^+ ion loss
ributes to the apparent hyposecretion of acid
atients with gastric ulcer; persistence of an
rmal gastric mucosal barrier to H^+ ions may ex-
n the high recurrence rate of gastric ulcers;
an abnormal gastric mucosal barrier may be a
ursor to gastric ulceration in rheumatoid arthri-

ANASTOMOTIC ULCERATION.

(E.) Cleator,
I. G. M.; Holubitsky, I. B.; Harrison, R.
Dept. Surg., Univ. British Columbia, Vancouver,
da). *Ann. Surg.* 179(3):339-351, 1974.

e were 331 patients who were treated for 390
odes of anastomotic ulceration at 2 Vancouver
itals. These patients were followed and
ing treatments for their anastomotic ulceration
evaluated in terms of mortality and recur-
e rate. The overall death rate from ulcer or
treatment was 6% of the 331 patients, and 15% had
rther ulcer recurrence after surgical treatment.
he group treated surgically for a second ulcer,
developed a third ulcer. One patient developed
th and fifth anastomotic ulcers. Barium meal
effective in diagnosing 51% of the 321 anastomot-
lcers in which this examination was carried out.
acid output studies were most useful in the post-
rectomy with or without vagotomy groups: a
l of over 12 mEq. was diagnostic of hypersecretion
was present in 40% of the patients with anastom-
ulcers. Gastroscopy gave a positive result in
33% of the 72 instances in which it was employed;
was in the prefiber-optic era. Of the patients
anastomotic ulcer, 74% had prandial pain and 56%
l or more episodes of hemorrhage. Perforation of
nastomotic ulcer was present in 5% of the patients,
ructive symptoms in 9%, and gastro-jejunocolic
ulae in 2%. There were no patients with secreting
rs of the pancreas or parathyroid. Of 140 Bill-
II anastomotic ulcers, 6% had retained antrum in
duodenal stump. After comparison of the mortality
recurrence rate of the various treatment options
lable in this and other studies, it is concluded
vagotomy is the treatment of choice for post-
rectomy anastomotic ulcer, for postvagotomy and
nage anastomotic ulcer and for postgastrectomy
vagotomy anastomotic ulcer. It is also
luded that partial gastrectomy alone is
treatment of choice for postgastroenterostomy
tomotic ulcer.

SALIVARY SECRETION IN SUBJECTS WITH DUODENAL ULCER.

(E.) Andre, C.; Descos, F.;
e, F.; Lambert, R. (Edouard Herriot Hosp., Lyon,
ce). *Digestion* 9(6):525-531, 1973.

thy subjects and patients suffering from an evolu-
duodenal ulcer were compared with respect to
uts of organic and inorganic components of saliva.
r stimulation of the salivary and pharyngeal se-
ion by a collection tube that was positioned in
stomach, the volume of saliva and the hexosamines,
ic acid, sulfate, total proteins, potassium and
free calcium outputs were lower in duodenal ulcer patients than in controls. The differences were not observed when the salivary secretion was collected in patients chewing Parafilm, when pharyngeal secretion was not stimulated by the collection tube in the stomach.

3753 GASTRIC ACIDITY UROPEPSIN AND URINARY 17-KETOSTEROIDS IN BURNS.

(E.) Mathur, P. N.; Singh, P. P.; Rathore, A. S.; Shastri, K. D. (R.N.T. Med. Coll., Udiapur, India). *Indian J. Med. Res.* 61(11):1618-1624, 1973.

Gastric secretions, acidity, uropepsin, and urinary 17-ketosteroids were measured in 35 burn patients on postburn days 3, 10, and 17. All were elevated on the third postburn day. The elevations were greatest in the group with more than 30% burn injury who died after day 17 due to massive exanguinating gastrointestinal hemorrhage. They decreased progressively in patients with less than 30% burn injury, returning to almost normal by postburn day 17. In other patients, they were maximum on the 10th day and decreased on the 17th day regardless of the clinical condition, thus suggesting adrenal insufficiency. It appeared that hyperactivity of the adrenal cortex in burn stress induced hyperacidity, and it was concluded that corticosteroid therapy in small doses would be beneficial in acute burns.

3754 IMMUNOLOGICAL REACTIONS IN PEPTIC ULCER.

(Rus.) Kalenskii, V. Kh. (Khar'kov Med. Inst., USSR). *Vrach. Delo* (2):77-80, 1974.

Autoimmunity was studied in 120 patients (88 men and 32 women, aged 18-60 yr) with peptic ulcers. These consisted of 110 patients with duodenal ulcers and 10 with stomach ulcers. Ouanier's reaction, a measure of autoimmunity of the immediate type, demonstrated that 99 of the 115 patients tested (86.1%) had circulating antiorgan antibodies. Using gastric and duodenal tissues from these patients as antigen, the *in vitro* lymphocyte transformation test, a measure of autoimmunity of the delayed type, was positive in 107 of 120 cases (89.2%). The extent of transformation differed: it was greatest in patients with long histories of ulcers and in those with evidence of scar formation. An inverse relation was found between the results from Ouanier's reaction and those of the lymphocyte transformation test. In most cases the level of humoral autoantibodies was highest in those with less pronounced cellular autoimmunity. When an increase occurred in the level of circulating autoantibodies during therapy, symptoms disappeared rapidly, while symptoms persisted if cellular autoimmunity remained the same or increased. These findings suggest that circulating autoantibodies might be responsible for manifestations of peptic ulcer, but that at a certain stage they assume a protective role by suppressing cellular autoimmunity.

3755 A PROSPECTIVE STUDY OF STRESS ULCERATION IN VIETNAM. *(E.)* Bowen, J. C.; Fleming, W. H. (Walter Reed Army Inst. Res., Washington, D. C.). *South. Med. J.* 67(2):156-160, 1974.

In an attempt to elucidate the pathogenesis of stress ulceration, a prospective study was undertaken among combat casualties in Vietnam. Of 2720 patients undergoing operations, 37 (14%) meeting the following criteria were selected: 1) severe injury, 2) no gastric or duodenal injury, 3) expected to remain at an evacuation hospital for at least 5 days, and 4) added to study if systemic sepsis developed at the hospital. Of the patients studied, 19 bled from the stress ulcer, 9 required transfusion, 4 required gastric resection, 2 rebled postoperatively, and 7 died. Four of these deaths were related to stress ulcers. Gastroscopic findings in 15 high-risk patients indicated multiple superficial erosions in 11, craters in 9, and no ulcers in 4. Twenty eight different substances considered as possible mediators of stress ulcer were measured in the blood, urine, or gastric juice, but none showed any significant, or even suggestive, correlations with the presence or absence of either bleeding or endoscopically demonstrated ulcerations. A significant difference was demonstrated between the levels of serum gastrin with and without central nervous system injury, but no correlation was found between stress ulceration and either gastrin or central nervous system injury. The failure in this study to identify specific etiologic factors which correlate with the appearance of upper gastrointestinal bleeding supports the observation that many of the patients had evidence of stress ulceration gastroscopically, even though they did not have gross hemorrhage. This suggests that local rather than systemic factors may play a large role in determining the degree of ulceration and hemorrhage. It seemed likely that acid in the lumen of the stomach under conditions of stress probably potentiates the injury to the gastric mucosa.

3756 EFFECT OF ATROPINE ON BASAL AND INSULIN-STIMULATED GASTRIC SECRETION IN PATIENTS WITH PEPTIC ULCER. *(Rus.)* Vartanian, G. V. (Kuban Med. Inst., Krasnodar, USSR). *Terapevitcheskiy Arkhiv* 45(8):104-107, 1973.

3757 MECHANISMS OF HYPERCHLORHYDRIA IN DUODENAL ULCER. *(Rus.)* Fishzon-Ryss, Iu. I.; Kotovoi, O. L.; Lianda, M. Iu; Papikian, M. Kh.; Uspenskii, V. M. (Military Med. Acad., Leningrad, USSR). *Terapevticheskiy Arkh* 45(8):60-65, 1973.

3758 BLOOD GROUPS AND PREDISPOSITION TO PEPTIC ULCER. *(Rus.)* Nikula, T. D.; Kushniruk, Iu. I. (Kiev Med. Inst., USSR). *Ter. Arkh.* 45(8):48-52, 1973.

3759 COMPARATIVE DUODENAL MOTILITY IN PATIENTS WITH AND WITHOUT DUODENAL ULCER DISEASE. *(E.)* Monto, G. L.; Ashworth, W. D.; Malecki, M.; Thompson, A. B.; Englert, E. (Univ. Nebraska Coll. Med., Omaha). *Am. J. Gastroenterol.* 61(2):113-118, 1974.

3760 SELECTIVE VAGOTOMY PLUS SUPRAPYLORIC ANTRECTOMY WITH AND WITHOUT PYLOROTOMY FOR DUODENAL ULCER. *(E.)* Griffith, C. A. (Univ. Washington Sch. Med., Seattle). *Ann. Surg.* 179(4): 516-518, 1974.

3761 THE PATHOPHYSIOLOGY OF DUODENAL ULCERATION *(E.)* Wormsley, K. G. (Dept. Ther., Univ. Dundee, Scotland). *Gut* 15(1):59-81, 1974.

3762 FIVE TO TEN YEARS AFTER TRUNCAL VAGOTOMY AND ANTRECTOMY: RESULTS OF FOLLOW-UP IN 111 PATIENTS. *(Ger.)* Nothiger, F.; Ghazal, R.; Deucher, F.; Fehr, H. (Cantonal Hosp., Aarau, Switzerland). *Helv. Chir. Acta* 41(1/2):131-137, 197

3763 SELECTION OF VAGOTOMY TECHNIQUES IN DUODENAL ULCER. *(Ger.)* Eckmann, L. (Tiefena Hosp., Bern, Switzerland). *Helv. Chir. Acta* 41(1/2) 143-146, 1974.

3764 VAGOTOMY IN CASES OF DUODENAL ULCER. *(Sw.* Liedberg, G.; Oscarson, J. (Univ. Hosp., Lund, Sweden). *Lakartidningen* 70(40):3479-3482, 1973.

3765 THE PATHOGENESIS AND PATHOPHYSIOLOGY OF STRESS ULCERS. *(Ger.)* Kruck, F. (Med. Clin., Univ. Saarland, Homburg, Germany). *Med. Klin* 68(43):1389-1393, 1973.

3766 CHOKED DISK ASSOCIATED WITH A BLEEDING ULCER. *(Ger.)* Wenig, C. (Neurol. Clin., Univ. Homburg/Saar, Germany). *Med. Welt* 24(39):1473 1476, 1973.

3767 RADIOLOGICAL CONTRIBUTION TO THE ESTABLISH MENT OF INDICATIONS AND THE SELECTION OF SURGICAL PROCEDURES FOR RECONSTRUCTION OF BILLROTH II INTO BILLROTH I GASTROENTEROSTOMIES. *(Ger.)* Sapounov, S. (Marien Hosp., Hamburg, Germany). *Radiologe* 13(9):394-397, 1973.

3768 USE OF THE ANTICHOLINERGIC AND ANTISPASMODIC, PRAMIVERIN, TO OBTAIN DRUG-INDUCED VAGOTOMY. *(Sp.)* Morel, C. J. (Cosme Argerich Munic. Hosp., Buenos Aires, Argentina). *Rev. Esp. Enferm. Apar. Dig.* 42(1):73-80, 1974.

3769 PRIMARY HYPERPARATHYROIDISM AND PEPTIC ULCER DISEASE. *(E.)* Christiansen, J. (Rigshosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(2):111-114, 1974.

0 GASTRIC EMPTYING AND DUODENAL DIGESTION BEFORE AND AFTER PARTIAL GASTRECTOMY AND ECTIVE PROXIMAL VAGOTOMY. *(E.)* Moberg, S. . Erik's Hosp., Stockholm, Sweden). *Scand. J. troenterol.* 9(Suppl. 24):1-39, 1974.

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3 BILLROTH I STOMAL OBSTRUCTION BY THE LIGAMENTUM TERES. *(E.)* Hyland, G.; onnell, R. C. J. (St. Vincent's Hosp., Dublin, land). *Am. J. Surg.* 127(5):606-608, 1974.

4 EFFECT OF VAGOTOMY ASSOCIATED WITH PYLOROPLASTY ON IRON BALANCE AND VITAMIN B_{12} THE BODY. *(Pol.)* Zalewski, H.; Szymanska, H.; erska, J. (Pomeranian Acad. Med., Szczecin, Poland). *. Tyg. Lek.* 28(44):1727-1730, 1973.

5 LONG-TERM RESULTS OF VAGOTOMY FOR THE TREATMENT OF DUODENAL ULCER. *(Pol.)* yluk, T. (Pomeranian Acad. Med., Szczecin, land). *Pol. Tyg. Lek.* 28(44):1733-1734, 1973.

6 COMPARATIVE EVALUATION OF METHODS FOR INDUCING EXPERIMENTAL GASTRIC ULCERS. *us.)* Nikulin, A. A.; Budantseva, S. I. (I. P. vlov Med. Inst., Ryazan, USSR). *Farmakol. Toksikol.* (5):564-567, 1973.

77 EXPERIMENTAL AND CLINICAL STUDIES ON THE ACTION MECHANISM OF CARBENOXOLONE. 3. FECT OF CARBENOXOLONE ON GASTRIC MUCUS SECRETION MAN. *(Ger.)* Gheorghiu, T.; Frotz, H.; Klein, J. (Med. Clin., Univ. Cologne, Germany). *Verh. sch. Ges. Inn. Med.* 78:1415-1418, 1972.

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79 EFFECT OF NEUTRALIZING THE GASTRIC JUICE WITH MAGNESIUM HYDROXIDE ON THE GASTRIN NCENTRATION IN PATIENTS WITH DUODENAL ULCERS. *er.)* Feurle, G. (Med. Polyclin., Univ. Heidelerg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78: 25-1626, 1972.

3780 PRESENCE OF YEAST-LIKE FUNGI AND GEOTRICHUM IN THE STOMACH AFTER VAGOTOMY ASSOCIATED WITH PYLOROPLASTY. *(Pol.)* Zalewski, H.; Stelmaska, E.; Raszke, K. (Pomeranian Acad. Med., Szczecin, Poland). *Pol. Tyg. Lek.* 28(52):2054-2057, 1973.

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3782 THE RESULTS OF A STUDY OF THE PATHOGENESIS OF DUODENAL ULCER. *(E.)* Masevitch, C.; Gorchkow, W.; Broun, L. (Leningrad Med. Inst. Hyg. Sanitation, USSR). *Acta Hepatogastroenterol.* 21(1):58-62, 1974.

3783 SECRETAGOGUE GLOBULINS IN THE BLOOD OF DUODENAL ULCER PATIENTS. *(E.)* Dobi, S.; Petranyi, G. (Univ. Med. Sch., Debrecen, Hungary). *Acta Med. Acad. Sci. Hung.* 30(3):205-210, 1973.

3784 PERFORATED PEPTIC ULCER IN PARAPLEGIA. *(E.)* Walsh, J. J.; Nuseibeh, I.; El-Masri, W. (Stoke Mandeville Hosp., Aylesbury, England). *Paraplegia* 11(4):310-313, 1974.

3785 TREATMENT OF ULCER PATIENTS WITH THE ANABOLIC STEROID RETABOLIL. *(Rus.)* Gadjiyev, H. E.; Mizamudinov, S. M. (Makhachkala Med. Inst., USSR). *Vrach. Delo* (3):76-79, 1974.

3786 MEDICAL STUDY OF 62 DUODENAL ULCERS TREATED BY VAGOTOMY AND PYLOROPLASTY. *(Fr.)* Roudier, M.; Bodin, F.; Lichtenstein, H.; Conte, M. (St. Antoine Hosp., Paris, France). *Sem. Hop. Paris* 50(14):935-939, 1974.

3787 ACUTE PEPTIC ULCER WITH HEMORRHAGE. REPORT OF 100 CASES. *(Fr.)* Bodin, F.; Lichtenstein, H.; Conte-Marti, J.; Conte, M. (St. Antoine Hosp., Paris, France). *Sem. Hop. Paris* 50(14):929-934, 1974.

3788 TRUNCAL VAGOTOMY AND MUCOSAL PYLOROPLASTY IN THE TREATMENT OF CHRONIC DUODENAL ULCERATION. *(E.)* Brown, C. (Royal Free Hosp., London, England). *Br. J. Clin. Pract.* 28(4):115-119, 1974.

3789 SURGICAL THERAPY OF CHRONIC PEPTIC ULCER. PREOPERATIVE ASSESSMENT, CHOICE OF OPERATIONS, AND CONSEQUENCES. *(E.)* Dodsworth, J. M.; Fischer, J. E. (Massachusetts Gen. Hosp., Boston). *Surg. Clin. North Am.* 54(3):529-547, 1974.

3790 REFLUX GASTRITIS FOLLOWING GASTRIC SURGERY. *(E.)* Drapanas, T.; Bethea, M. (Tulane

Univ. Sch. Med., New Orleans, La.). *Ann. Surg.* 179(5):618-627, 1974.

3791 SURGICAL MANAGEMENT OF PERFORATED PEPTIC ULCER. *(E.)* Jordan, Jr., G. L.; DeBakey, M. E.; Duncan, Jr., J. M. (Baylor Coll. Med., Houston, Tex.). *Ann. Surg.* 179(5):628-633, 1974.

3792 PEPTIC ULCER IN RURAL TOGO (WEST AFRICA). *(E.)* Gogler, H. (Bethesda Hosp., Agou, Togo). *Trop. Geogr. Med.* 25(4):335-340, 1973.

3793 DUODENAL ULCERS IN IBADAN, NIGERIA. *(E.)* Kolawole, T. M.; Solanke, T. F. (Univ. Coll. Hosp., Ibadan, Nigeria). *Trop. Geogr. Med.* 25(4):325-334, 1973.

3794 EXTENDED NEUTRALIZATION OF GASTRIC CONTENTS WITH DUCON. *(E.)* Riegel, N.; Tesler, M. A.; Zimmon, D. S.; Jolly, E. R. (Biometric Testing Inc., Englewood Cliffs, N.J.). *Am. J. Dig. Dis.* 19(4):335-337, 1974.

3795 KALLIKREIN-KININ SYSTEM IN POSTGASTRECTOMY DUMPING SYNDROME. *(E.)* Wong, P. Y.; Talamo, R. C.; Babior, B. M.; Raymond, G. G.; Colman, R. W. (Boston City Hosp., Mass.). *Ann. Int. Med.* 80(5):577-581, 1974.

3796 THE EFFECT OF SOME NATURAL SUBSTANCES ON ULCERATION OF RAT STOMACH CAUSED BY ACETYLSALICYLIC ACID. *(Rus.)* Obolentseva, G. V.; Khadzhai, Ya. I.; Vidiukova, A. I.; Larianovskaia, Iu. B. (Kharkov Res. Chem-Pharm. Inst., USSR). *Biul. Eksp. Biol. Med.* 77(3):39-41, 1974.

3797 THE RADIOLOGICAL APPEARANCES OF THE STOMACH AND DUODENUM FOLLOWING NONEXCISIONAL OPERATIONS FOR GASTRIC AND DUODENAL ULCERS. *(Ger.)* Stauch, G. W.; Löhr, E.; Boettcher, I.; Beersiek, F.; Eigler, F. W. (No affil.). *Fortschr. Roentgenstr* 120(1):31-41, 1974.

3798 SLEEP STAGES, GASTRIC ACID SECRETION, AND SERUM GASTRIN CONCENTRATIONS. *(E.)* Orr, W. C.; Hall, W. H.; Stahl, M.; Durkin, M. G.; Whitsett, T. (Univ. Oklahoma Health Sci. Ctr., Oklahoma City). *Gastroenterology* 66(4):756, 1974.

3799 ULCER DIATHESIS AND BLOOD GROUP. *(Ger.)* Klempa, I.; Peter, H.; Kestel, C.; Becker, R. (Ctr. Surg., Univ. Frankfurt/Main, Germany). *Munchen. Med. Wochenschr.* 116(18):933-936, 1974.

3800 TREATING PEOPLE WITH PEPTIC ULCERS. *(E.)* Dock, W. (VA Hosp., New York, N.Y.). *NY State J. Med.* 74(4):674-676, 1974.

3801 DOUBLE DIVERTICULUM OF THE VATERIAN REGION SIMULATING TWO POSTOPERATIVE ULCERS IN A PATIENT WHO HAD UNDERGONE GASTRECTOMY AND GASTRODUODENOSTOMY. *(Fr.)* Debray, C.; Leymarios, J.; Paolaggi, J. A. (Bichat Hosp., Paris, France). *Sem. Hop. Paris* 50(18):1211-1213, 1974.

3802 DEGENERATED ULCER OF THE LESSER CURVATURE OF THE STOMACH. *(Fr.)* Chatelin, C. L.; Fissore, A.; Campora, J. L.; Lasserre, M. (Princess Grace Hosp. Ctr., Monaco). *Sem. Hop. Paris* 50(18):1203-1205, 1974.

See also, 3430, 3449, 3647, 3648, 3661, 3721, 3743, 4123.

SMALL INTESTINE

3803 TUBERCULOUS ENTERITIS. A REPORT OF THREE PATIENTS. *(E.)* Moss, J. D.; Knauer, C. M. (Santa Clara Valley Med. Ctr., San Jose, Calif.). *Gastroenterology* 65(6):959-966, 1973.

Case reports are presented for 3 patients with tuberculous enteritis; 2 developed the rare complication of free intestinal perforation. All 3 patients, aged 6, 29, and 35 yr, had recently emigrated from Mexico and had active pulmonary tuberculosis with radiological evidence of intestinal involvement. Symptoms which occurred in these patients included weight loss, anorexia, abdominal distention, fever, and iron-deficiency anemia. In one patient the diagnosis was established on the basis of caseating granulomas with acid-fast bacilli found in the mucosa, submucosa, muscularis, and serosa of the small intestine. Surgical specimens were not available for the other 2 patients, but one of them had radiological evidence of miliary pulmonary tuberculosis, noncaseating granulomas in a liver biopsy, acid-fast bacilli in both stool and gastric washings, and a good response to antituberculous therapy. The remaining patient had radiological evidence of tuberculosis and developed increasing abdominal symptoms after a pulmonary cavity developed. This patient had been treated for rheumatoid arthritis for 3 yr with adrena corticosteroids and salicylates before developing symptoms of tuberculosis. She developed resistance to isoniazid, streptomycin, and p-aminosalicylic acid and had to be treated with ethionamide and ethambutal Latex fixation and lupus erythematosus tests were pos

. The youngest patient had several episodes of small
l obstruction with abdominal distention and, on
occasion, peritoneal free air which cleared on
ervative management. The oldest patient developed
toms of a perforated viscus and, at laparotomy,
generalized peritonitis with 3 small bowel per-
ations and a serosa studded with tubercles.
orations were closed surgically, but the patient
a very stormy postoperative course which required
re surgical procedures. Complications consisted
variety of systemic bacterial and fungal infec-
s. Tuberculous enteritis should be considered in all
ents with abdominal masses that present clinically
ographically, particularly in the presence of pul-
ry disease.

INTESTINAL BYPASS IN MORBID OBESITY. *(E.)*

Corso, P. J.; Joseph, W. L. (George Wash-
on Univ. Med. Ctr., Washington, D.C.). *Surg.*
col. Obstet. 138(1):1-5, 1974.

4 massively obese patients (289-485 pounds) an
stinal bypass procedure induced weight loss
ly with a lack of significant metabolic abnor-
ties. Criteria for selection of candidates for
noileal bypass were 2 to 3 times ideal weight
a period of at least 3 yr; failure of dietary
mens or exercise programs; absence of any correc-
e endocrinopathy; absence of other diseases or
rmalities which might increase the operative risk
ypass; patient understanding and cooperation; and
ence of certain complications or diseases com-
y associated with obesity which might be allevi-
by a significant reduction in weight. All
ents underwent operation through a long abdominal
ine incision. The bypass procedure consisted
n end-to-end anastomosis of the proximal part
he jejunum to the distal part of the ileum.
distal end of the bypassed jejunoileum was drained
nastomosis to the sigmoid colon. The proximal
ion of the bypassed jejunum was used to close
mesenteric defect posterior to the jejunoileo-
y. This technique prevented not only internal
iation of the bypassed intestine but also pos-
e intussusception postoperatively. There have
no operative deaths, and all the patients were
lable for follow-up studies. Problems with
d healing occurred in 1/3 of the patients. Di-
ea was a regular problem in the immediate post-
ative period. A low-fat diet, restriction of
ds with meals, and the occasional use of small
nts of paregoric or diphenoxylate hydrochloride
lted in adequate control. The majority of pa-
ts averaged a 20-25 pound decrease in weight
r the operation and the catabolic state induced
he immediate postoperative period. The greatest
ction in weight occurred during the 1st yr (79-
pounds). This loss of weight occurred without
ges in dietary habits since all the patients
continued to consume the same large quantities
ood they did prior to the bypass operation.
e who were hypertensive preoperatively still re-
e antihypertensive medications, but to a lesser
ee. Jejunoileal bypass reduced carbohydrate
rption. In 5 of 7 patients with a preoperative
etic glucose tolerance curve, there was a flat-
ng of the curve into the normal range. Malabsorption of fat was apparent from the large increase in fecal fat. There was also a fall in serum triglycerides and cholesterol levels. Serum magnesium, calcium, and potassium levels remained stable. The serum carotene level remained consistently low (30-40 mg%). It is concluded that with the technique described, a satisfactory rate of loss of weight can be obtained with minimal side effects and no mortality.

3805 GLUCAGON, GASTRIN, AND CARCINOID TUMORS OF THE DUODENUM, PANCREAS, AND STOMACH: POLYPEPTIDE "APUDOMAS" OF THE FOREGUT. *(E.)*

Friesen, S. R.; Hermreck, A. S.; Mantz, F. A., Jr. (Univ. Kansas Med. Ctr., Kansas City). *Am. J. Surg.* 127(1): 90-101, 1974.

The clinical and investigative findings in 11 selected patients are presented which illustrate various degrees of functional activity of polypeptide-secreting amine precursor uptake and decarboxylation cell endocrinopathies of the foregut. Six patients with carcinoid tumors presented with as many different clinical pictures, including the Zollinger-Ellison syndrome, hyperparathyroidism, the carcinoid syndrome, the familial multiple endocrine adenomatosis syndrome, Cushing's syndrome, and hyperglucagonism with diabetes. Four patients with diabetes and nonbeta islet cell carcinoma are presented in whom presumptive and assay evidence implicates glucagon activity of the tumors. Two patients with amine precursor uptake and decarboxylation cell abnormalities (one with diarrheogenic islet cells hyperplasia and one with duodenal paraganglioma) and in whom no known polypeptides have been identified are also presented. The embryologic, cytochemical, and functional capabilities of the neuroendocrine cells of the foregut are interrelated, and when these cells are hyperplastic or neoplastic, they may produce unusual clinical pictures which are more easily diagnosed by bioassay and immunochemical than by histologic methods.

3806 INTESTINAL LYMPHOMA WITH UNUSUAL SEQUENCE OF SERUM IgA CHANGES. *(E.)*

Shaklai, M.; Mintz, U.; Pinkhas, J.; Pick, A.; Ben-Bassat, M.; DeVries, A. (Tel-Aviv Univ. Med. Sch., Israel). *Am. J. Dig. Dis.* 19(3):279-286, 1974.

A 32-yr-old woman with Mediterranean lymphoma presented in the course of her fatal disease an unusual sequence of quantitative serum IgA changes but at no time free alpha chains. The patient was further remarkable in that she developed a cervical lymphadenopathy of Hodgkin's disease type, which was reversed by chemotherapy without cure of the intestinal lymphoma. During the 3 yr of observation, the patient had marked hypoproteinemia and hypoalbuminemia. Noteworthy is the sequence of the changes in the serum IgA from a marked elevation early in the illness, through an undetectable level, to a reappearing marked increase. Serum IgG remained normal throughout the course of the disease; the serum IgM was low throughout. Jejunal biopsy revealed a massive cellular infiltrate in the intestinal mucosa, consisting of 2 types of cells: monomorphous lymphocytic cells revealing a small nucleolus and a fine chromatin pattern, and a small number of plasma cells. The histological diagnosis was malignant lymphoma, lymphocytic type. Histological sections taken from the small bowel revealed a diffuse heavy cellular infiltration of the intestinal mucosa along its entire length, with a slight local invasion of the muscularis mucosa. Marked villus atrophy and loss of glandular elements of the intestinal mucosa were noted. The Hodgkin's type cervical lymphadenopathy that developed in the course of the disease is considered to have represented an additional malignant clone appearing consequent to immunological deficiency.

3807 HEPATIC EFFECTS OF JEJUNOILEAL BYPASS FOR MORBID OBESITY. *(E.)* Brown, R. G.; O'Leary, J. P.; Woodward, E. R. (Univ. Florida Coll. Med., Gainesville). *Am. J. Surg.* 127(1):53-58, 1974.

Experience with 37 intestinal bypass operations in 36 patients is reported. Documented severe liver failure occurred in 6 patients with 1 death. The failure is manifested by the onset of anorexia, nausea, crampy abdominal pain, and vomiting. The earliest detectable functional abnormality appears to be a decrease in uptake of technetium sulfa colloid by the liver. BSP retention is followed by hypoalbuminemia and hypokalemia. Elevation of the SGOT, SGPT, and alkaline phosphatase levels may occur at this time. Fluid retention with weight gain, peripheral edema, and ascites is rapidly followed by hyperbilirubinemia of the conjugated type. Lesser degrees of abnormal liver function were discovered in 8 other patients. Halothane anesthesia, hepatitis-associated antigen, alcoholism, and diabetes do not appear to be factors.

3808 AORTOENTERIC AND PARAPROSTHETIC-ENTERIC FISTULAS: PROBLEMS OF DIAGNOSIS AND MANAGEMENT. *(E.)* Elliott, Jr., J. P.; Smith, R. F.; Szilagyi, D. E. (Henry Ford Hosp., Detroit, Mich.). *Arch. Surg.* 108(4):479-490, 1974.

The clinical characteristics, surgical treatment, and therapeutic results were surveyed in 11 cases of aortoenteric and 8 cases of paraprosthetic-enteric fistulas observed in 2085 abdominal aortic reconstructive operations. The clinical manifestations of these lesions were exsanguinating hemorrhage or medically uncontrollable retroperitoneal sepsis. The diagnosis of aortoenteric or paraprosthetic-enteric fistulization must be assumed in every case of abdominal aortic reconstruction with late hemorrhagic or septic complications. The indicated treatment is early and aggressive surgical intervention supported with appropriate antibiotic medication. Some operative technical details appear useful in reducing the probability of occurrence of these complications. In the case of dense adherence between the duodenum and the aneurysmal sac, the freeing of the duodenum must be omitted and a part of the aneurysmal sac left on the duodenal wall. To avoid erosion of the duodenal wall, live, well-vascularized tissue should be interposed between the duodenum and the graft.

3809 LIVER BIOPSY FINDINGS IN SEVENTY-SEVEN CONSECUTIVE PATIENTS UNDERGOING JEJUNOILEA BYPASS FOR MORBID OBESITY. *(E.)* Buchwald, H.; Lober, P. H.; Varco, R. L. (Univ. Minnesota Med. Sch., Minneapolis). *Am. J. Surg.* 127(1):48-52, 1974.

Liver biopsies were performed on 11 male and 66 female morbidly obese patients to clarify the status of hepatic morphology existent at the time of jejunoileal bypass. All results of preoperative liver function tests were within normal limits. Twenty-eight of the patients (36%) had a normal liver morphology; 24 had less than 25% fatty infiltration; 9 had 25 to 50% fatty infiltration; 16 had greater than 50% fatty infiltration; and no patient exhibite fibrosis. None of the 11 males had normal liver architecture. Fatty infiltration was represented by intracellular hepatocyte vacuolization. No significant disturbances in hepatic architecture were observed in these biopsy sections. There appears to be a definite positive correlation of the degree of fatty liver infiltration with the percentage of overweight. The more obese the patient, the more likely the demonstration of fatty changes in the liver, and the average percentage of fat present in the liver rises as a function of the increase in excess weight.

3810 MAGNESIUM METABOLISM IN MAN WITH SPECIAL REFERENCE TO JEJUNOILEAL BYPASS FOR OBESIT *(E.)* Swenson, Jr., S. A.; Lewis, J. W.; Sebby, K. R. (Univ. Nebraska Coll. Med., Omaha). *Am. J. Surg.* 127(3):250-255, 1974.

The current knowledge of metabolic pathways of magnesium are discussed and cases are presented in which the altered metabolism of magnesium is of clinical importance. An adult maintains a body content of approximately 20-30 g of magnesium. The most well-known action of magnesium is its effect on the neuromuscular junction. Magnesium repletion leads to a decrease in neuronal excitability; depletion leads to an increase in excitability. Magnesium serves as an activator for many enzyme systems of intracellular metabolism. Most important among these enzymes are those that hydrolyze and transfer phosphate groups, including the enzymes concerned with reactions involving adenosine triphosphate. Magnesium is essential in the synthesis of protein, being necessary for DNA, RNA, and ribosomal function. Absorption begins within 1 hr of ingestion and continu at as steady rate for 2-6 hr with little absorption taking place after 12 hr. The kidney is the principal organ in the homeostasis of the magnesium ion. In severe renal disease there is a decrease in the amount of magnesium ion filtered by the kidney. Magnesium seems to be controlled by a variety of hormones in the body. Parathormone increases the serum level of magnesium. Thyrocalcitonin lowers the serum level of magnesium and decreases the urinary excretion of magnesium. Hyperaldosteronism has been associated with hypomagnesemia. Hypomagnesemia has been found in some patients with hyperthyroidism. The diagnosis of magnesium deficiency is usually made after either a chronic, inadequate, or excessive loss of magnesium. The clinical manifestations of hypomagnesemia are neuromuscular irri-

ility and central nervous system hyperirritability.
:al aberrations are also prominent. Hypertension
developed in some patients who were previously
otensive. Other changes include personality
nges, muscle weakness, vertigo, and tetany. Con-
ions that lead to magnesium depletion include:
trointestinal malfunction, diuretic therapy,
longed use of i.v. fluids without magnesium sup-
mentation, severe infections, and chronic alco-
ism. Therapy for hypomagnesemia is indicated
there are clinical symptoms and depressed
m or tissue levels. Hypermagnesemia usually re-
ts from increased intake with poor renal function
from treatment of toxemia of pregnancy. The symp-
s of hypermagnesemia are usually lethargy, uncon-
ousness, hypotension, and hyperreflexia. Five
e reports are presented of patients with magnesium
letion. Hypomagnesemia in these cases was of
rogenic origin, as all had undergone small bowel
ass for obesity.

ROTATIONAL ABNORMALITIES OF THE GUT: RE-
EMPHASIS OF A NEGLECTED FACET, ISOLATED
MPLETE ROTATION OF THE DUODENUM. *(E.)* Firor, H.
Harris, V. J. (Cook County Hosp., Chicago, Ill.).
J. Roentgenol. Radium Ther. Nucl. Med. 120(2):
-321, 1974.

omplete rotation of the duodenum with normal ro-
ion of the colon is a significant facet of the
rotation syndrome. Lack of fixation of the right
on may accompany this abnormality. When this is
sent, midgut volvulus may occur; this is uncommon.
s abnormality presents with vomiting as the prin-
al symptom. The onset may be in infancy or as
e as adult life. Upper gastrointestinal contrast
dy is the only examination required to make this
gnosis. Treatment consists of mobilization of
colon into the nonrotated position, lysis of the
denum, and ruling out an intrinsic duodenal ob-
uction.

2 MALIGNANT CARCINOID TUMOUR WITH GANGRENE
OF THE SMALL INTESTINE. *(E.)* Murray-Lyon,
M.; Rake, M. O.; Marshall, A. K.; Williams, R.
ng's Coll. Hosp., London, England). *Br. Med. J.*
395):770-771, 1973.

e histories are presented of 4 patients with a
ignant carcinoid tumor of the small bowel (3 had
carcinoid syndrome) who developed gangrene of
small intestine. Three of the patients had ex-
s 5-hydroxyindole secretion. The development of
grene of the small intestine may be difficult to
ognize and distinguish from the other causes of
ominal pain associated with carcinoid tumors, but
prolonged and constant quality of the pain may
of diagnostic help. Although all 4 of the patients
d, recognition of this complication should lead to
lier laparotomy with the chance of resecting the
ected segment of bowel. A prominent feature in
cases was a proliferation of elastic tissue in
adventitia and intima of the mesenteric vessel,
the vessel lumens were not much narrowed, and
s alone does not seem sufficient to account for
development of gangrene. In 2 of the cases, thrombosis of mesenteric vessels had probably also occurred and this, together with restriction of mesenteric flow due to pressure by tumor tissue and the striking fibrous reaction in the root of the mesentery, is likely to be more important. The pathogenesis of the characteristic fibrous reaction is unknown.

3813 INTESTINAL INJURIES INCIDENTAL TO IRRADIATION OF CARCINOMA OF THE CERVIX OF THE UTERUS. *(E.)* Schmitz, R. L.; Chao, J. H.; Bartolome, Jr., J. S. (Mercy Hosp. Med. Ctr., Chicago, Ill.). *Surg. Gynecol. Obstet.* 138(1):29-32, 1974.

Most irradiation injuries to the intestinal tract are incidental to therapy given for carcinoma in the cervix uteri or endometrium. While temporary nausea, vomiting, cramping, and diarrhea are common, significant injury occurs in less than 5% of the cases. If the exposure is in small dosages at long intervals in a total amount less than 4000 r, the effects are not severe. However, if the exposure is in larger dosages at shorter intervals, in a total amount exceeding 4500 r, the effects are proportionately more severe. When the dosage is heavy enough in a localized area, necrosis of the intestine may occur with hemorrhage, sloughing or perforation. After the acute reaction to such heavy dosages subsides, an endarteritis develops, followed or accompanied by atrophy and cicatrization. Thirty-seven patients with irradiation injuries were treated. The clinical symptoms were those of colitis. The injury occurred in the ileum 14 times, in the sigmoid 3 times, and in the rectum 20 times. In 29 patients, the primary disease was in the cervix uteri and in 8 patients, in the endometrium. The types of injury include enterocolitis, local ulceration, rectovaginal fistula, atrophy, and neoplasia. A wide range of methods of treatment is necessary in treating patients with these injuries. In some instances, vigorous conservative management is sufficient to heal rectal ulcers. This includes transfusions, bland diet, opiates, corticosteroids, stool softeners, and warm oil enemas. In other instances, temporary diversionary colostomy will be necessary for 6 to 12 months to permit healing. Diversionary operations included temporary loop colostomy, end-on sigmoid colostomy, or internal ileotransverse colostomy. Most operations were resective in nature and had the advantage of removing the diseased tissue for microscopic analysis. There were 2 hospital deaths in the series.

3814 URINARY TRACT STONE AFTER SMALL BOWEL BYPASS FOR MORBID OBESITY. *(E.)* O'Leary, J. P.; Thomas, Jr., W. C.; Woodward, E. R. (Univ. Florida Coll. Med., Gainesville). *Am. J. Surg.* 127(2):142-147, 1974.

The incidence, type of urinary tract stone, and the pathophysiologic aspects of its production were studied in 31 morbidly obese persons who had undergone small bowel bypass. Nine patients had end-to-end jejunoileal shunts and 22 had end-to-side jejunoileal shunts. In 7 of the 31 patients (3 males and 4 females), urinary tract stones developed.

Four of these patients had symptoms of calculi, but in 3 patients the stones were detected on routine roentgenography. One patient had had a stone previously, but the composition of the stone had changed from magnesium-ammonium-phosphate to calcium oxalate after bypass. Another patient had had a stable, small, radiopaque stone for 13 yr and it had enlarged since the operation. Six patients were fed a constant 1700 kcal diet for 1 to 6 weeks. All patients demonstrated marked hyperoxaluria on the first 24 hr collection of urine. Two patients with renal calculi were treated with taurine (2.0 g 4 times daily) and 2 were treated with cholestyramine (4.0 g 3 times daily) for at least 4 days. These patients had no change in urinary excretion of oxalate. All patients had marked steatorrhea. Efforts to reduce additional formation of stones in those patients with bypass and with calculi have been limited to correction of the acidosis, reduction of the caloric intake, and avoidance of excessive amounts of those liquids containing large amounts of soluble oxalate such as tea and fruit juices.

3815 LEIOMYOMAS OF THE SMALL INTESTINE. *(Fr.)*

Mabille, J. P.; Cortet, P.; Gaudet, M.; Seigneuric, C.; Gambert, B. (Univ. Hosp. Ctr., Dijon, France). *Ann. Radiol. (Paris)* 16(11/12): 773-779, 1973.

A 59-yr-old woman had 4 episodes of melena over a 1-yr period and symptoms suggestive of König's syndrome. Although no abnormalities were found in intestinal transit, superior mesenteric arteriography revealed the presence of a well vascularized benign tumor on the outside of the small intestine. At surgery an exoluminal tumor was found in the mesentery about 60 cm from the ileocecal valve. It was an intestinal leiomyoma with no evidence of malignancy. A 44-yr-old woman with an 8-yr history of melena, hypochromic anemia, and symptoms suggestive of König's syndrome had a tumor the size of a grapefruit in the left hypochondrium. A barium swallow showed that this tumor was located in the jejunum. At surgery the tumor was found in the duodenojejunal angle. It compressed the first loop of the small intestine in the front and adhered to the transverse mesocolon, peritoneum, and lower pole of the left kidney in back. No peritoneal or hepatic metastases were detected. Although clinical and radiological findings suggested that the tumor was a lymphoreticulosarcoma, histological examination revealed that it was a leiomyoma which had undergone edematous, necrotic, and hemorrhagic changes.

3816 JEJUNOILEAL BYPASS FOR MASSIVE OBESITY: RESULTS AND COMPLICATIONS IN FIFTY-TWO PATIENTS. *(E.)*

Fikri, E.; Cassella, R. R. (Western Pennsylvania Hosp., Pittsburgh). *Ann. Surg.* 179(4): 460-464, 1974.

Between 1967 and 1972, 52 patients (47 females and 5 males with an average age of 30 yr) underwent jejunoileal bypass for morbid obesity in one hospital. The majority of the patients were 140-240 pounds above the ideal weight. The average duration of hospitalization was 14 days. The average loss in preoperative body weight was 39% after jejunoileal bypass. The body weight stabilized after 18-30 months postsurgery, and three patients gained 15-30 pounds 1-3 years after their weight had stabilize Operative complications included major and minor wound infections, atelectasis, pneumonia, pulmonary embolism, pancreatitis, high output enterocutaneous fistural, and, in one case, death. Delayed complications after jejunoileal bypass included incisional hernias, hepatocellular insufficiency, fatty metamorphosis of the liver, diarrhea, intussusception, dilatation of the colon, electrolyte imbalance, and recurrent urinary tract calculi. Two patients died of cardiac arrest and liver failure. Twenty patient had hypertension before bypass; after bypass, 11 became normotensive and 8 showed improvement. Five patients were preoperatively diabetic; after bypass, 2 no longer required medication and the dose of insulin was reduced in the other 3. Forty-five patien had hypercholesterolemia prior to bypass; after surgery the serum cholesterol levels dropped to a range of 90-150 mg%. The majority of patients were please with the results and enjoyed improved psychological, social, and economic adjustment.

3817 INTESTINAL OBSTRUCTION IN THE NEONATE DUE TO VITELLINE DUCT CYSTS. *(E.)*

Grosfeld, J. L.; Franken, E. A. (Indiana Univ. Sch. Med., Indianapolis). *Surg. Gynecol. Obstet.* 138(4):527-532, 1974.

An incomplete form of intestinal obstruction was observed in 3 neonates. In all 3, the abdominal mass was caused by vitelline duct cysts which were characterized by the delayed onset of abdominal distention, bilious vomiting, and the presence of a palpable abdominal mass. The mass was located in the midportion or right side of the abdomen. Roentgenograms of the abdomen demonstrated a cystic mass with either an air-fluid level or a soap-bubble appearance and evidence of partial obstruction of the small intestine in each instance. Lateral roentgenographic views of the abdomen confirmed the relation of the vitelline cyst to the umbilicus. Barium enema studies demonstrated a normal caliber colon and indicated that the mass was not of colonic origin. Surgical treatment varied in each instance, depending on conditions present at the time of operation. In the first patient, simple V-shaped resection of the base of the cyst from the normal ileum and transverse ileoplasty were required. In the second patient, extensive intestinal resection, temporary enterostomy formation, and end-to-end anastomosis were required to reestablish intestinal continuity. In the last patient, the base of the cyst was quite large, requiring intestinal resection along with the cyst and a primary end-to-end ileal anastomosis. In each patient, operative therapy provided satisfactory results. Diagnosis of communicating vitelline duct cyst should be suspected in infants if the characteristic clinical and roentgenographic patterns are observed.

3818 NEW PARAMETERS OF VIABILITY IN ISCHEMIC BOWEL DISEASE. *(E.)*

Katz, S.; Wahab, A.; Murray, W.; Williams, L. F. (Boston Univ. Med. Ctr., Mass.). *Am. J. Surg.* 127(2):136-141, 1974.

values of electromyography, pH determination, and
azolium analysis of the mucosa were assessed in
to provide objective criteria of bowel viability.
azolium mucosal analysis correlated well with
ologic patterns of cellular destruction. It
rly showed the harmful effects of revasculariza-
on ischemically insulted mucosa. The mucosal
tudies revealed that the shifts merely reflected
act of revascularization and were of no value
viability index. Tetrazolium, although a re-
le index of mucosal damage, has limited clinical
ication because of the time required for analy-
Electromyography provides supportive evidence
urvival of the muscularis, whether intrinsic
soidal wave form or spike activity is found. The
ification of minor peristaltic activity in the
of spike waves is a new and easily interpre-
e guide to viability. Serosal pH has a limited
if taken separately. However, the combination of
rosal pH in a range of 7.35 to 7.85 with electro-
raphic evidence of muscularis survival supplies
eful parameter of viability. The finding of an
lotic pH of 7.95 to 8.40 in ischemically damaged
l, even in the presence of electromyographic ac-
ty, would suggest significant, probably pregan-
ous changes in that segment.

THE STATE OF THE SMALL INTESTINE MUCOSA
IN VARIOUS TERMS AFTER RADICAL OPERATIONS
CANCER OF THE CARDIA. *(Rus.)* Pechatnikova, E.
Ral'chenko, A. I.; Belikov, E. S.; Zenkov, V.
Tyumen Med. Inst., USSR). *Vestn. Khir.* 111
26-30, 1973.

SMALL INTESTINAL ATRESIA: THE CRITICAL
ROLE OF A FUNCTIONING ANASTOMOSIS. *(E.)*
as, Jr., C. G.; Carter, J. M. (Univ. North
lina Sch. Med., Chapel Hill). *Ann. Surg.*
5):663-670, 1974.

LIPOMATOSIS OF THE ILEOCECAL VALVE. *(E.)*
Berk, R. N.; Davis, G. B.; Cholhassey, E.
Univ. California, Sch. Med., San Diego). *Am. J.*
tgenol. Radium Ther. Nucl. Med. 119(2):323-328,

ANEURYSMAL LYMPHOMA OF THE SMALL INTESTINE.
(E.) Norfray, J.; Calenoff, L.; Zanon,
B. (Northwestern Mem. Hosp., Chicago, Ill.).
J. Roentgenol. Radium Ther. Nucl. Med.
2):335-341, 1973.

SMALL BOWEL POLYPS AND CARCINOMA IN MUL-
TIPLE INTESTINAL POLYPOSIS. *(E.)* Ross,
.; Mara, J. E. (VA Hosp., Syracuse, N.Y.).
Surg. 108(5):736-738, 1974.

DUODENAL "DIVERTICULIZATION" FOR DUODENAL
AND PANCREATIC INJURY. *(E.)* Berne, C.
Donovan, A. J.; White, E. J.; Yellin, A. E.
t. Surg., Univ. Southern California, Los Angeles).
J. Surg. 127(5):503-507, 1974.

3825 CARCINOID SYNDROME. *(Por.)* Chaves, E.; dos Santos, A. D.; Beltrao, A.; da Silva, L. P. (Napolaeo Laureano Cancer Hosp., Joao Pessoa, Brazil). *Arq. Gastroenterol. S. Paulo* 11(1):35-39, 1974.

3826 EARLY AND LATE PROGNOSIS OF THE CONGENITAL DUODENAL OBSTRUCTION. *(Ger.)* Kleinschmidt, F.; Muller, E.; Gries, H. M.; Kissler, B. (Surg. Clin., Polyclin., Univ. Dusseldorf, Germany). *Z. Kinderchir.* 13(3):322-328, 1973.

3827 RECURRENT OBSTRUCTION OF THE SMALL INTESTINE. *(Fr.)* Chatelin, C. L.; Fissore, A.; Campora, J. L. (Princess Grace Hosp. Ctr., Monaco). *Sem. Hop. Paris* 50(18):1214-1216, 1974.

3828 SUBSEROSAL SCHWANNOMA OF THE SECOND PART OF THE DUODENUM WITH SYMPTOMS OF A TUMOR AND ANEMIA. *(Fr.)* Lagache, G.; Proye, C.; Laurent, J. C. (Munic. Hosp., Lille, France). *Sem. Hop. Paris* 50(18):1208-1210, 1974.

3829 BLEEDING MECKEL'S DIVERTICULUM AS BIG AS A MAN'S FIST. *(Ger.)* Hessing, J.; Stolze, T. (2nd Med. Clin., Univ. Dusseldorf, Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 120(1):112-113, 1974.

3830 SYNDROMES CAUSED BY CHANGES IN TRANSIT IN THE SMALL INTESTINE. *(It.)* Barbara, L. (Inst. Med. Pathol., Univ. Bologna, Italy). *Minerva Med.* 65(11):571-580, 1974.

3831 ILEO-CAECAL JUNCTION LIPOMATOSIS. REPORT OF 7 CASES. *(Fr.)* Bourgeon, R.; Borelli, J.-P.; Koch, G. (St.-Roch Hosp., Nice, France). *Arch. Fr. Mal. App. Dig.* 63(1):33-40, 1974.

3832 CHANGES OF THE DUODENUM IN CHRONIC DISEASES OF THE KIDNEYS. *(Rus.)* Luzhis, A. R.; Agova, E. M. (Leningrad 1st Med. Inst., USSR). *Vrach. Delo* (3):71-74, 1974.

3833 ABSORPTION OF ANTICONVULSANTS AFTER JEJUNOILEAL BYPASS. *(E.)* Peterson, D. I.; Zweig, R. W. (Loma Linda Univ., Sch. Med., Calif.). *Bull. Los Angeles Neurol. Soc.* 39(2):51-55, 1974.

3834 NONOCCLUSIVE MESENTERIC INFARCTION. *(E.)* Ottinger, L. W. (Massachusetts Gen. Hosp., Boston). *Surg. Clin. North Am.* 54(3):689-698, 1974.

3835 PRIMARY MALIGNANT LYMPHOMA OF THE DUODENUM PRESENTING WITH MELAENA AND HAEMATEMESIS: A BRIEF REPORT. *(E.)* Gupta, I. M.; Gupta, S.; Udupa, K. N.; Rastogi, B. L.; Char, G. (Inst. Med.

Sci., Banaras Hindu Univ., Varanasi, India). *Aust. N.Z. J. Surg.* 43(3):242-243, 1973.

3836 EOSINOPHILIC INFILTRATION OF THE SMALL INTESTINE. *(E.)* O'Brien, M. M.; Ewing, M. R. (Wimmera Base Hosp., Victoria, Australia). *Aust. N.Z. J. Surg.* 43(3):239-241, 1973.

3837 ADENOACANTHOMA OF THE SMALL BOWEL. REPORT OF A CASE. *(E.)* Bjerregaard, E. (Bispebjerg Hosp., Copenhagen, Denmark). *Acta Pathol. Microbiol. Scand.* [*A*] 82(1):113-115, 1974.

3838 CARCINOID TUMOR OF THE SMALL INTESTINE MANIFESTED AS INTESTINAL ISCHEMIA. *(Fr.)* Chaput, J. C.; Beaugrand, M.; Strich, M. Martin, E.; Etienne, J. P. (Antoine Beclere Hosp., Clamart, France). *Arch. Fr. Mal. App. Dig.* 63(1):49-53, 1974.

3839 MANAGEMENT OF 97 CHILDREN WITH DUODENAL OBSTRUCTION. *(E.)* Wayne, E. R.; Burrington, J. D. (Univ. Colorado Med. Ctr., Denver). *Arch. Surg.* 107:857-859, 1973.

3840 INTRALUMINAL DIVERTICULUM OF THE DUODENUM -- CASE REPORT AND REVIEW OF THE LITERATURE. *(E.)* Kermond, A. J. (Roy. Melbourne Hosp., Australia). *Aust. Radiol.* 17(4):411-414, 1973.

3841 MULTIPLE "AGONAL" INTUSSUSCEPTION OF THE SMALL BOWEL. *(E.)* Nixon, J. R. (Belfast City Hosp., Ireland). *J. Ir. Med. Assoc.* 67(5):134-136, 1974.

3842 POSITIVE INTESTINAL SCAN CAUSED BY CARCINOID TUMOR. *(E.)* Polga, J. P.; Sargent, J.; Dickinson, P. (Bethesda Lutheran Hosp., St. Paul, Minn.). *J. Nucl. Med.* 15(5):365-366, 1974.

3843 PERFORATION OF THE ILEUM IN A CHILD. *(E.)* Hinkamp, J. F.; Byrne, M. P.; De Bartola, Jr., H. M. (no affil.). *J. Pediatr. Surg.* 9(2):253-254, 1974.

3844 JEJUNOILEAL BYPASS FOR GROSS OBESITY: YES OR NO? *(E.)* Anonymous. (no affil.). *Med. World News* 15(16):62-64, 1974.

3845 BLIND LOOP SYNDROME. *(E.)* Rogers, A. I.; Rothman, S. L. (VA Hosp., Miami, Fla.). *Postgrad. Med.* 55(4):99-105, 1974.

3846 INTESTINAL BYPASS OPERATION FOR MASSIVE OBESITY. *(E.)* Bleicher, J. E.; Cegielski, M.; Saporta, J. A. (Creighton Univ. Sch. Med., Omaha, Nebr.). *Postgrad. Med.* 55(4):65-70, 1974.

3847 MORPHOMETRIC STUDY OF THE JEJUNAL MUCOSA IN PATIENTS SUBJECTED TO GASTRIC SURGERY. *(Sp.)* Serra Desfilis, M. A.; Rodrigo Gomez, J. M.; Guix Garcia, J.; Aparisi Quereda, L.; Parrilla Paricio, P.; Barbera Guillem, E. (Fac. Med., Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 42(4):353-366, 1974.

3848 DRAINAGE OF THE SMALL INTESTINE IN PATIENTS WITH PERITONITIS. *(E.)* Guzeev, A. I. (Novgorod City Hosp., USSR). *Vestn. Khir.* 111(10):36-40, 1973.

See also, 3382, 3571, 3585, 3615, 3616, 3617, 3696, 3707, 3718, 3733, 3857, 3890, 3909, 4077, 4079, 4083, 4107.

SMALL INTESTINE

Malabsorption

3849 DETECTION OF DECONJUGATION OF BILE SALTS BY MEASUREMENT OF THE SPECIFIC ACTIVITY OF $^{14}CO_2$ IN EXPIRED AIR. *(E.)* Myerson, R. M.; Pineda, V. L.; Levison, M. E.; Rabinowitz, J. L. (VA Hosp., Philadelphia, Pa.). *Am. J. Med. Sci.* 267(1):35-39, 1974.

Bile acid deconjugation was assessed by measuring $^{14}CO_2$ specific activity of breath samples taken at intervals following p.o. administration of 1-^{14}C-glycocholic acid to 10 normal controls, 7 cirrhotics, 5 patients with steatorrhea unrelated to abnormalities of bile salt metabolism, 4 patients with stasis syndromes of the small bowel, 4 who had undergone ileal resection or bypass, and 10 with miscellaneous gastrointestinal disorders unassociated with steatorrhea. Marked increases in the $^{14}CO_2$ specific activity were observed in breath samples taken from all 4 patients with stasis syndromes and steatorrhea. These consisted of 3 patients with afferent loop syndrome following Billroth II gastroenterostomy and 1 with stasis and bacterial overgrowth secondary to scleroderma of the small intestine. Bacteriological examinations performed on jejunal contents from the patient with scleroderma showed 10^8 nonhemolytic *Escherichia coli*, 10^8 β-hemolytic *E. coli*, and 10^6 *Bacteroides melaningenicus*. Excessive bile salt deconjugation and steatorrhea were found in 3 patients who had underbone ileal resection or bypass for regional ileitis and in a

ent who developed a gastrocolic fistula after
ic ulcer surgery. Large numbers of *Bacteroides*
cultured from the stools and stomach contents
he latter patient. These results indicate that
th analysis is a rapid, simple, and safe method
detecting increased bile salt deconjugation and
be a valuable adjunct to investigation of pa-
ts with steatorrhea.

TROPICAL SPRUE IN SOUTH VIETNAM. *(E.)*
Miller, M. B.; Loftus, P. M.; Lohr, D. C.;
olds, R. D.; Bratton, J. L.; Hanson, J. P.; Keil,
. (12th USAF Hosp., Cam Ranh Bay, South Vietnam).
t. Med. 139(1):17-20, 1974.

clinical course, laboratory manifestations, and
lts of therapy of 12 cases of tropical sprue in
h Vietnam are presented. The diagnosis of
ical sprue was suspected whenever patients
ented with an insidious illness of nonbloody
rhea, characteristic stools, weight loss, and
al temperature. Many patients had gray-brown
tchy pigmentation of the skin, glossitis,
minal bloating, early satiety, anorexia,
ness and orthostatic hypotension. Weight loss
ed between 10 and 45 pounds, with a mean loss
7 pounds. Weight loss was related to duration
ymptoms before admission. All 12 patients
ially demonstrated abnormally low excretion to
lose, which ranged from 0.6 to 4.3 gm. A flat
ose tolerance test was found in 7 of 8 patients
ed. The small bowel series was definitely ab-
al in 8 of 10 patients studied. The charac-
stic X-ray small bowel findings have been as-
ed to atony of the bowel, characterized by the
ographic description of dilatation, segmentation,
mentation, flocculation, and moulage formation.
ncrease of neutral fat demonstrated by conven-
al fat stain on the stool was abnormal in all 12
ents tested. The average length of hospitali-
on for the 14 patients was 27 days. Four
ents failed to respond after 1 week of a gluten-
e diet. Four patients did not demonstrate a
atic response to therapy with folic acid alone,
subsequently responded within 3 days or less
n tetracycline was added.

THE EFFECT OF THERAPEUTIC IRRADIATION OF THE ABDOMEN ON INTESTINAL ABSORPTION IN
(E.) Sobo, A. O.; Johnston, I. D. A. (Dept.
otherap. Univ. Newcastle Upon Tyne, England).
J. Gastroenterol. 60(6):616-624, 1973.

effect of therapeutic irradiation on the absorp-
n of glucose, xylose, fat and Vitamin B_{12} was
lied in 12 male patients, 21 to 66 yr old with
ignant disease of the testis. Patients were
ated from the front and the back on alternate
s and a central dose of 150 rads was given daily.
total central dose during treatment was 3,000
s given over a period of 28 days. Glucose toler-
e at the end of treatment was reduced, but recov-
d 6 weeks later, indicating malabsorption. At
same time, the treated subjects showed decreased
e of urinary excretion of ingested vitamin B_{12}
incrased rate of fecal excretion of ingested fat. In contrast, urinary secretion of ingested xylose was not affected. One patient had severe diarrhea and excreted fecal fat at a rate of 58 gm/day towards the end of treatment. It is concluded that therapeutic irradiation affects the absorption of glucose, Vitamin B_{12} and fat but not of xylose, from the small intestine in man. The malabsorption observed after irradiation continued for some weeks and could explain in part the loss of weight associated with abdominal radiation in the absence of diarrhea.

3852 CALCIUM ABSORPTION FROM MILK AND LACTOSE-FREE MILK IN HEALTHY SUBJECTS AND PATIENTS WITH LACTOSE INTOLERANCE. *(E.)*
Kocian, J.; Skala, I.; Bakos, K. (Inst. Postgrad. Med. Training, Charles Univ., Prague, Czechoslovakia). *Digestion* 9(4):317-324, 1973.

By means of isotope ^{47}Ca, changes in the rate and intensity of calcium absorption from lactose-free and normal milk were investigated in healthy volunteers and in 11 patients (7 males and 4 females, aged 20-35 yr) with lactose intolerance. Fecal and urinary loss of ^{47}Ca and calcium retention were also studied. In healthy subjects the rate of absorption of calcium after ingestion of lactose-free milk was lower than that observed after ingestion of normal milk. In subjects with lactose intolerance, the opposite relationship was obtained. The total amount of absorbed and retained calcium did not differ significantly, regardless of whether calcium was administered in milk or in lactose-free milk. No significant differences were found in the utilization of calcium in subjects with lactose intolerance. In these patients the retardation of the peaks of the absorption curves after milk ingestion suggests a compensatory delay of gastric evacuation. The slower supply of chyme into the gut improves the calcium utilization in spite of relative lactase insufficiency. Well-tolerated lactose-free milk could be used to ensure a sufficient dietary supply of calcium in subjects with lactose intolerance. These results indicate that it would be advantageous to administer calcium in lactose-free milk and dairy products which are readily tolerated to milk-intolerant patients.

3853 AMINO ACID RATIOS IN PROTEIN-ENERGY MALNUTRITION. *(E.)*
Gurney, J. M.; Ogbeide, M. I.; Reddy, S.; McFarlane, H. (Food Sci. Nutr. Unit, Dept. Pediatr., Univ. Ibadan, Nigeria). *Trop. Geogr. Med.* 25(4):387-392, 1973.

3854 LACTOSE MALABSORPTION AND MILK TOLERANCE IN KENYAN SCHOOL-AGE CHILDREN. *(E.)* Pieters, J. J. L.; Van Rens, R. (Med. Res. Ctr., Nairobi, Kenya). *Trop. Geogr. Med.* 25(4):365-371, 1973.

3855 SMALL BOWEL IN SKIN DISEASES. *(E.)* Bedi, T. R.; Bhutani, L. K.; Kandhari, K. C.; Tandon, B. N. (All-India Inst. Med. Sci., New Dehli). *Indian J. Med. Res.* 62(1):142-149, 1974.

3856 MALABSORPTION FOLLOWING GASTRECTOMY AND ILEAL RESECTION. *(E.)* Toffolon, E. P.; Goldfinger, S. E. (Massachusetts Gen. Hosp., Boston). *Surg. Clin. North Am.* 54(3):647-653, 1974.

3857 SMALL BOWEL ULCERATIONS - AN UNUSUAL COMPLICATION OF CELIAC DISEASE. *(E.)* Blau, J. S.; Stolzenberg, J.; Toffler, R. B. (Sch. Med., Yale Univ., New Haven, Conn.). *J. Can. Assoc. Radio* 25(1):77-78, 1974.

3858 FREE AMINO ACIDS OF THE BLOOD PLASMA IN ALIMENTARY PROTEIN DEFICIENCY OF MAN. *(Ru* Vysotsky, V. G.; Vlasova, T. F.; Ushakov, A. S.; Shishkina, S. K. (no affil.). *Vopr. Pitan.* (2):16-1 1974.

3859 MALDIGESTION AND MALABSORPTION: MAKING UP FOR LOST NUTRIENTS. *(E.)* Balacki, J. A.; Dobbins, III, W. O. (George Washington Univ. Med. Ctr., Washington, D.C.). *Geriatrics* 29(5):157-170, 1974.

See also, 3622, 3625.

LARGE INTESTINE

3860 AN ULTRASTRUCTURAL STUDY OF THE LOCALIZATION OF THE CARCINOEMBRYONIC ANTIGEN IN ADENOCARCINOMAS OF THE HUMAN COLON. *(E.)* Huitric, E. (Ctr. Regional de Lutte contre le Cancer, Cedex, France). *Ann. Immunol. (Inst. Pasteur)* 124C(4):603-608, 1973.

An attempt was made to define the ultrastructural position of carcinoembryonic antigen (CEA) on the luminal surface of the tumoral cells lining neoplastic glands. Frozen 40 μ thick sections from surgically removed colonic tumors were incubated in turn in a rabbit antiserum directed against human colonic tumors, in sheep antirabbit peroxidase labeled antibody, and in 3-3' diaminobenzidine to reveal the peroxidase activity. Some sections were incubated in 3-3' diaminobenzidine alone. All controls incubated in normal rabbit serum were negative. However, some positive reactions were observed in the lumen of several tumoral glands. That reaction was also encountered in sections incubated in diaminobenzidine alone, and was assumed to be linked to a CEA specific marker. After the light microscopic examination, ultrathin sections (1 μ) with strong CEA activity were processed for electron microscopy. The sites of CEA activity appear as a continuous dense border lining the apical pole of the cells of the tumoral glands. A CEA positive reaction can also be seen on the outer lining of small circular bodies, measuring approximately 30 mμ in diameter, encountered along the outer leaflet of the apical membrane, around and between microvilli or along the cytoplasmic projections. CEA seems to be localized in the outer leaflet of the apical membrane of tumoral cells, more precisely, in the glycoprotein coating of these cells. The close association of CEA with the cell coat may account for the variations observed optically in the intensity of the CEA reaction. In the tumoral glands, where the apical border of the cells is frequently very altered, the intensity of the CEA reaction will reflect the state of the apical pole of tumoral cells. No CEA was seen with an intracellular localization, neither at the light nor at the electron microscopic level.

3861 MALIGNANT ANORECTAL MELANOMAS. *(Fr.)* Huguier, M.; Luboinski, J. (Rothschild Hosp., Paris, France). *Arch. Fr. Mal. App. Dig.* 62(7):579-590, 1973.

The diagnosis, treatment, and prognosis are considered for 17 patients (12 women and 5 men, aged 38-74 yr) with malignant melanomas of the anorectum (16 cases) or rectum (1). The lesion simulated complicated hemorrhoids in 4 cases and anorectal suppuration in 1. Mucosa covering the lesion was not ulcerated in 4 cases, and the tumor was pedunculated in 3. One patient had 2 tumors. Pigmentation was present in 9 of these 17 cases. Lesions ranged in size from 1 to more than 10 cm. Three patients presented with signs of dissemination: melanuria (1), cervical adenopathy (1), and hepatic and pulmonary metastases, bilateral inguinocrural adenopathy, and a pigmented nodule on the thorax (1). Errors in diagnosis were initially made in 3 cases because of difficulties in distinguishing unpigmented melanomas from undifferentiated carcinomas or adenocarcinomas and fibroblastic sarcomas. Abdom inal perineal resections were performed in 6 patient and local excision of the tumor on 6 others. Four patients received radiotherapy and 1 was given chemo therapy. Signs of metastases eventually developed in 16 of these patients. Eleven patients died 1-50 months after institution of treatment, and 4 patient are still alive after 36-48 months. Survivals of more than 1.5 yr were obtained in 2 patients by removal of local recurrences.

3862 MALAKOPLAKIA: PATHOGENESIS AND ULTRASTRUC TURAL MORPHOGENESIS: A PROBLEM OF ALTERED MACROPHAGE (PHAGOLYSOSOMAL) RESPONSE. *(E.)* Lou, T.

Teplitz, C. (Rhode Island Hosp., Providence).
Pathol. 5(2):191-207, 1974.

ttempt was made to trace the ultrastructural
hogenesis of malakoplakia with specific emphasis
lucidating the various developmental stages in
formation of the pathognomonic calcific laminated
usions (Michaelis-Gutmann bodies) in the charac-
stic "von Hansemann histiocytes." The etiologic
ts in the pathogenesis of the colonic malakopla-
lesion studied were ultrastructurally and bac-
ologically identified as coliform bacteria (*E.*
and Klebsiella). Intact bacilli were first
ent in macrophagic phagosomes. Bacteria in var-
states of morphologic integrity were then found
in coalescent and progressively enlarging phago-
somes. Giant phagolysosomal bodies then showed de-
rative change of both matrix and limiting mem-
es in otherwise ultrastructurally intact macro-
es. Finally, the deposition of calcium crystals
in these large phagolysosomes led to the develop-
of the characteristic concentrically laminated,
stage Michaelis-Gutmann inclusions. The morpho-
c features of colonic malakoplakia are identical
he more commonly occurring genitourinary form,
a review of the accumulated data suggests that,
rdless of site, the morphogenesis and pathogene-
of malakoplakia may well be the same. The ultra-
ctural demonstration of an unusual metamorphosis
hagolysosomes within macrophages, plus the over-
available information in the literature, suggests
malakoplakia probably represents a morphologic
festation of altered host macrophage response,
that gram negative enteric bacilli may be the
common specific etiologic agent. In the light
oscopic prediagnostic stage, the earliest or
mal pathologic criterion for the diagnosis of
koplakia is the ultrastructural identification of
negative bacilli or their remnants among very
e macrophagic lysosomes showing early evidence of
ium phosphate deposition.

COLON CANCER AND BLOOD-CHOLESTEROL. *(E.)*
Rose, G.; Blackburn, H.; Keys, A.; Taylor,
.; Kannel, W. B.; Paul, O.; Reid, D. D.; Stam-
J. (St. Mary's Hosp. Med. Sch., London, England).
et 1(7850):181-183, 1974.

rnationally, there is a correlation between mortal-
rates for colonic cancer and coronary heart dis-
, with dietary fat being suspected as a common
logical factor. Thus, it is hypothesized that
in a population, the levels of blood cholesterol
dietary fat should predict the risk of colonic
er. Pooled data from 6 studies of coronary
t disease in men yielded 90 cases of fatal colon
er. In 57 of these cases, the initial blood
esterol value was below the expected value, the
deviation of the standardized scores being
3 (corresponding to 5-7 mg/100 ml) and the median
ation being -0.26 (10-13 mg/100 ml). This ten-
y was not significantly correlated with the in-
al from screening to death, nor was it seen in
s involving other alimentary carcinomas. The
ency to low blood cholesterol levels in the co-
c cancer patients was significant at the 5%
l.

3864 RADIATION THERAPY IN THE MANAGEMENT OF EPIDERMOID CARCINOMA OF THE ANAL REGION. *(E.)* Papillon, J. (Leon Berard Ctr., Lyon, France). *Dis. Colon Rectum* 17(2):181-187, 1974.

3865 ACCIDENTAL PERFORATION OF THE RECTUM. *(E.)* Frankel, H. L. (Stoke Mandeville Hosp., Aylesbury, Bucks, England). *Paraplegia* 11(4): 314-316, 1974.

3866 INTESTINAL BIOFEEDBACK IN FUNCTIONAL DIARRHEA: A PRELIMINARY REPORT. *(E.)* Furman, S. (Psychiatric Ctr. Alvarado, San Diego, Calif.). *J. Behav. Ther. Exp. Psychiat.* 4(4):317-321, 1973.

3867 ADENOCARCINOMA OF COLON AND RECTUM: ROLE OF RADIATION THERAPY. *(E.)* Suit, H. D. (Massachusetts Gen. Hosp., Boston). *Surg. Clin. North Am.* 54(3):733-740, 1974.

3868 MANAGEMENT OF CANCER OF THE COLON. *(E.)* Donaldson, G. A.; Welch, J. P. (Massachusetts Gen. Hosp., Boston). *Surg. Clin. North Am.* 54(3):713-731, 1974.

3869 COLONIC DIVERTICULAR DISEASE WITH SURGICAL TREATMENT. A STUDY OF 338 CASES. *(E.)* Rodkey, G. V.; Welch, C. E. (Massachusetts Gen. Hosp., Boston). *Surg. Clin. North Am.* 54(3):655-674 1974.

3870 POLYPOID LESIONS OF THE COLON. WHICH SHOULD BE REMOVED? *(E.)* Behringer, G. E. (Massachusetts Gen. Hosp., Boston). *Surg. Clin. North Am.* 54(3):699-712, 1974.

3871 RECTAL CARCINOMA: ABDOMINOPERINEAL AND ANTERIOR RESECTIONS. *(E.)* Malt, R. A.; Nundy, S. (Massachusetts Gen. Hosp., Boston). *Surg. Clin. North Am.* 54(3):741-750, 1974.

3872 ADENOACANTHOMA ARISING IN A DIVERTICULUM OF THE COLON: REPORT OF A CASE. *(E.)* Drut, R. (Univ. La Plata Med. Sch., Argentina). *Dis. Colon Rectum* 17(2):258-261, 1974.

3873 VERRUCOUS TUBERCULOSIS OF THE ANAL CANAL: REPORT OF A CASE. *(E.)* Alankar, K.; Rickert, R. R.; Sen, P.; Lazaro, E. J. (New Jersey Med. Sch., Newark). *Dis. Colon Rectum* 17(2):254-257, 1974.

3874 CONSERVATIVE AND RADICAL THERAPY IN THE ANORECTAL REGION. *(Ger.)* Stelzner, F.

(Surg. Ctr., Univ. Frankfurt/Main, Germany). *Med. Welt* 24(41):1576-1577, 1973.

3875 EVALUATION AND TREATMENT OF PROCTOCOLITIS. *(Ger.)* Dolle, W. (Med. Clin., Univ. Tubingen, Germany). *Med. Welt* 24(41):1580-1583, 1973.

3876 A TECHNIQUE FOR POSTERIOR MYECTOMY AND INTERNAL SPHINCTEROTOMY IN SHORT-SEGMENT HIRSCHSPRUNG'S DISEASE. *(E.)* Alexander, J. L.; Aston, S. J. (Martin Luther King, Jr. Gen. Hosp., Los Angeles, Calif.). *J. Pediatr. Surg.* 9(2):169-170, 1974.

3877 CLINICAL FEATURES OF APPENDICITIS IN ELDERLY PATIENTS. *(Rus.)* Kharchenko, V. O. (Reshetilovskaia Central Reg. Hosp., Poltava Reg., USSR). *Vrach Delo* (12):7-8, 1973.

3878 EXPERIMENTAL STUDIES OF UNEXPLAINED PROBLEMS IN OBSTRUCTIVE ILEUS OF THE COLON. *(Ger.)* Zlatarski, G. (Med. Fac., Rhenish-Westphalian Techn. Coll., Aachen, Germany). *Bruns Beitr. Klin. Chir.* 220(6):626-636, 1973.

3879 BILATERAL ATRESIA OF THE COLON WITH MUCOCELE AS A CAUSE OF A PSEUDOMYXOMA PERITONEI. *(Ger.)* Busch, B.; Poppe, I. R. (Rostock Hosp., Germany). *Zentralbl. Allg. Pathol.* 117:235-239, 1973.

3880 DIAGNOSIS AND TREATMENT OF DIVERTICULOSIS AND DIVERTICULITIS OF THE LARGE INTESTINE. *(Ger.)* Filippini, L. (Cantonal Hosp., Lucerne, Switzerland). *Med. Welt* 24(41):1583-1588, 1973.

3881 SMOOTH-MUSCLE TUMORS OF THE RECTUM IN JAPANESE. *(E.)* Hishida, Y.; Ishida, M. (Tokyo Univ. Sch. Med., Japan). *Dis. Colon Rectum* 17(2):226-234, 1974.

3882 LIPOMA OF THE COLON. *(E.)* Berk, R. N.; Werner, L. G. (Dept. Radiology, Univ. California, San Diego). *Am. J. Gastroenterol.* 61(2):145-150, 1974.

3883 NECROSIS OF THE DESCENDING COLON ASSOCIATED WITH A SIGMOID TUMOR. *(Ger.)* Gaal, C.; Nemeth, L. (Reg. Hosp., Szombathely, Hungary). *Chirurg* 44(10):478-479, 1973.

3884 BENIGN AND MALIGNANT TUMORS OF THE LARGE INTESTINE: CLASSIFICATION AND EVALUATION OF POSSIBLE MALIGNANCY. *(Ger.)* Elster, K. (Munic. Hosp., Bayreuth, Germany). *Med. Welt* 24(41):1573-1575, 1973.

3885 DIVERTICULOSIS OF THE APPENDIX: A COLLECTIVE REVIEW. *(E.)* Trollope, M. L.; Lindenauer, S. M. (Dept. Surg., Univ. Michigan, Ann Arbor). *Dis. Colon Rectum* 17(2):200-218, 1974.

3886 LYMPHANGIOMA OF THE LARGE INTESTINE: REPORT OF A CASE AND REVIEW OF THE LITERATURE. *(E.)* Berardi, R. S. (VA Hosp., Lexington, Ky.). *Dis. Colon Rectum* 17(2):265-272, 1974.

3887 DISCUSSION OF CLINICAL AND NEUROLOGICAL FEATURES OF FUNCTIONAL DISORDERS OF THE LARGE INTESTINE. *(It.)* Pontiggia, M. (Circolo Hosp. Varese, Italy). *Minerva Med.* 65(11):636-638, 1974.

3888 SEROUS CYST OF THE RIGHT MESOCOLON. *(Fr.)* Gautier-Benoit, C.; Luez, J. (Hosp. Ctr., Lens, France). *Sem. Hop. Paris* 50(18):1217-1218, 1974.

3889 RECTAL AND CUTANEOUS SITES OF ABRIKOSOFF TUMORS. *(Fr.)* Paris, J.; Ribet, M.; Dupont, A.; Paris, J. C.; Houcke; Bray, G. (Univ. Hosp. Ctr., Lille, France). *Sem. Hop. Paris* 50(18):1219-1221, 1974.

3890 HYPERSECRETING AND DEGENERATED VILLOUS RECTAL TUMOR. RECURRENCE OF PULMONARY TUBERCULOSIS. FIBROUS ILEOCECAL TUBERCULOSIS. *(Fr.)* Charles, J.; Blangy, J.; Nicodeme, G.; Baudry, M.; Cuisset, P.; Manouvrier, A. (no affil.). *Sem. Hop. Paris* 50(18):1222-1228, 1974.

3891 THE EXPLOSIVE POTENTIAL OF COLONIC GAS DURING COLONOSCOPIC ELECTROSURGICAL POLYPECTOMY. *(E.)* Ragins, H.; Shinya, H.; Wolff, W. I. (Albert Einstein Coll. Med., New York, N.Y.). *Surg. Gynecol. Obstet.* 138(4):554-556, 1974.

3892 MUSCULAR DISORDERS OF THE COLON. *(E.)* Misiewicz, J. J. (Central Middlesex Hosp., London, England). *Br. J. Hosp. Med.* 2(2):191-202, 1974.

3893 ISCHAEMIA OF THE COLON. *(E.)* Marcuson, R. W. (Norfolk Hosp., England). *Br. J. Hosp. Med.* 2(2):203-209, 1974.

3894 CARCINOMA OF THE COLON. *(E.)* Hawley, P. R. (St. Mark's Hosp., London, England). *Br. J. Hosp. Med.* 2(2):211-216, 1974.

3895 AN IMMUNOLOGIC RATIONALE FOR SUTURE LINE RECURRENCE IN CARCINOMA OF THE COLON. *(E.* Edynak, E. M. (Univ. Hawaii, Sch. Med., Honolulu). *J. Surg. Res.* 16(3):235-240, 1974.

6 HIGH BULK DIET FOR DIVERTICULAR DISEASE OF
THE COLON. *(E.)* Shulman, A. G. (Cedars-
ai Med. Ctr., Los Angeles). *West. J. Med.*
)(4):278-281, 1974.

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APPROACH TO THE COLON AND POLYPECTOMY.
) Wherry, D. C.; Zehner, Jr., H. (no affil.).
. Ann. D.C. 43(4):189-192, 1974.

8 MASSIVE BLEEDING CAUSED BY DIVERTICULOSIS
OF THE COLON. VALUE OF ARTERIOGRAPHY (RING
GE) AND COLOSCOPY. *(Fr.)* Debray, C.; Leymarios,
Crespon, B.; Nardi, C.; Martin, E. (Bichat
p., Paris, France). *Nouv. Presse Med.* 3(12):
-720, 1974.

9 IDIOPATHIC RECTOCOLITIS: NOTE ON THE PHY-
SIOPATHOLOGY. DIAGNOSTIC CRITERIA. *(It.)*
sano, C.; Torsoli, A. (2nd Med. Clin., Univ.
e, Italy). *Minerva Med.* 65(11):564-567, 1974.

0 TWO CASES OF FAMILIAL POLYPOSIS SIMULATING
LYMPHOID HYPERPLASIA. *(E.)* Neitzschman,
R.; Genet, E.; Nice, Jr., C. M. (Tulane Univ.
. Med., New Orleans, La.). *Am. J. Roentgenol.*
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1 GARDNER'S SYNDROME. A MODEL FOR CORRELA-
TIVE RADIOLOGY. *(E.)* Dolan, K. D.;
bert, J.; Seibert, R. W. (Univ. Hosp., Iowa
y, Iowa). *Am. J. Roentgenol. Radium Ther. Nucl.*
. 119(2):359-364, 1973.

2 THE INOPERABLE RECTAL CARCINOMA. *(E.)*
Strube, H.-D.; Schier, J. (Univ. Mainz,
many). *Abdom. Surg.* 16(4):100-101, 1974.

3 EVALUATION OF A MODIFIED DUHAMEL OPERATION
FOR CORRECTION OF HIRSCHSPRUNG'S DISEASE.
(E.) Talbert, J. L.; Seashore, J. H.; Ravitch, M. M. (Univ. Florida Coll. Med., Gainesville). *Ann. Surg.* 179(5):671-675, 1974.

3904 PERFORATED DIVERTICULUM OF THE TRANSVERSE COLON. *(E.)* Chughtai, S. Q.; Ackerman, N. B. (Menorah Med. Ctr., Kansas City, Mo.). *Am. J. Surg.* 127(5):508-510, 1974.

3905 RECTAL BLEEDING. *(E.)* Moody, F. G. (Univ. Utah Med. Ctr., Salt Lake City). *N. Engl. J. Med.* 290(15):839-841, 1974.

3906 THE INFLUENCE OF THE BOWEL SEGMENTS EXCLUSION ON DEVELOPMENT OF CANCER THERE. *(Rus.)* Pozharissky, K. M. (N. N. Petrov Res. Inst. Oncol., Leningrad, USSR). *Vestn. Khir.* 111(8): 52-57, 1973.

3907 RECTAL CANCER RECURRENCE IN PATIENTS SUBJECTED TO RADICAL SURGERY. *(Rus.)* Tselj, E. A. (N. N. Petrov Res. Inst. Oncol., Leningrad, USSR). *Vopr. Onkol.* 20(2):31-36, 1974.

3908 SYMPTOMATIC RETROSTERNAL (MORGAGNI) HERNIA. *(E.)* Wolloch, Y.; Grunebaum, M.; Glanz, I.; Dintsman, M. (Tel Aviv Univ. Med. Sch., Israel). *Am. J. Surg.* 127(5):601-605, 1974.

See also, 3383, 3398, 3530, 3613, 3617, 3619, 3623, 3630, 3634, 3649, 3660, 3666, 3667, 3804, 3818, 3821, 3825, 3831, 3834, 3845, 3909, 3963, 4060, 4079, 4083, 4107, 4111, 4125.

LARGE INTESTINE

Ulcerative Colitis

9 ILEOSTOMY WITH ILEAL RESERVOIR RATHER THAN
ILEOSTOMY ALONE. *(E.)* Beahrs, O. H.;
ly, K. A.; Adson, M. A.; Chong, G. C. (Mayo Clin.,
hester, Minn.). *Ann. Surg.* 179(5):634-638, 1974.

0 THE DIAGNOSIS AND MANAGEMENT OF COLITIS.
(E.) Lennard-Jones, J. E.; Ritchie, J. K.
. Mark's Hosp., London, England). *Br. J. Hosp.*
. 2(2):180-186, 1974.

ULCERATIVE COLITIS AND BEHCET'S SYNDROME:
VALUE OF COLONOSCOPY. *(Fr.)* Debray, C.;
Paolaggi, J. A.; Couturier, D.; Crespon, B. (Bichat Hosp., Paris, France). *Ann. Med. Interne (Paris)* 124(12):931-935, 1973.

3912 REGRESSION OF ACUTE "ULCERATIVE COLITIS": REPORT OF 4 CASES IN YOUNG WOMEN. *(Fr.)* Bonfils, S.; Le Quintrec, Y.; Blanc, D.; Gendre, J.-P.; Tran Dinh Can, M. (Bichat Hosp., Paris, France). *Arch. Fr. Med. App. Dig.* 63(1):5-16, 1974.

3913 IMMUNOSUPPRESSIVE DRUG THERAPY IN INFLAMMATORY BOWEL DISEASE. *(E.)* Kraft, S. C.

(Fac. Med., Univ. Chicago, Ill.). *Drug Ther.* 4(5):55-66, 1974.

3914 SOME PROBLEMS OF PATHOGENESIS OF NONSPECIFIC ULCERATIVE COLITIS. *(Rus.)* Levitan, M. Kh.; Marko, O. P.; Kapuller, L. L.; Drozdov, V. N.; Bolotin, S. M.; Shevchenko, M. A. (Proctol. Lab., Ministry Health RSFSR, Moscow, USSR). *Ter. Arkh.* 45(7):66-70, 1974.

3915 CURRENT METHODS IN THE CONSERVATIVE TREATMENT OF PATIENTS WITH NONSPECIFIC ULCERATIVE COLITIS. *(Rus.)* Shchetinina, I. N. (N. I. Pirogov 2nd Moscow Med. Inst., USSR). *Ter. Arkh.* 45(7):59-65, 1973.

3916 CLINICAL FEATURES OF THE ACUTE FORM OF ULCERATIVE COLITIS. *(Pol.)* Sierko, S.; Panek, M. (J. Sniadecki Provincial Hosp., Bialystok, Poland). *Pol. Tyg. Lek.* 28(33):1271-1273, 1973.

3917 CORTICOTROPINE AND CORTICOSTEROIDS IN HEMORRHAGIC ULCERATIVE COLITIS. *(It.)* Benedetti, A. (Reg. Munic. Hosp., Udine, Italy). *Minerva Med.* 65(11):610-611, 1974.

3918 SURGICAL ASPECTS OF ULCERATIVE COLITIS AND GRANULOMATOUS COLITIS. *(It.)* Biancalana, L. (no affil.). *Minerva Med.* 65(11):568-570, 1974.

See also, 3626, 4126, 4127, 4128, 4130.

PANCREAS

3919 PANCREATIC ABSCESS. *(E.)* Miller, T. A.; Lindenauer, M.; Frey, C. F.; Stanley, J. C. (Univ. Michigan Med. Ctr., Ann Arbor). *Arch. Surg.* 108(4):545-551, 1974.

Pancreatic abscesses were studied in 63 patients (47 males and 16 females, aged 18-77 yr) who were seen at the University of Michigan Medical Center from 1936 to 1972. Acute pancreatitis preceded abscess formation in 61 cases. Carcinoma of the ampulla of Vater and a posterior penetrating ulcer of the third portion of the duodenum in a patient with a Zollinger-Ellison tumor antedated abscess development in the remaining 2. Associated conditions included postoperative pancreatitis in 30, biliary tract disease in 17, alcoholism in 15. Bleeding complications affected 26 patients, 12 of whom died. Renal failure was encountered in 22, 19 of whom died. The mortality of the overall series was 53.9%. No patient survived without surgical intervention. The mortality following operative incision and drainage was 37%. Limited success following surgical therapy was attributed partly to delays in the diagnosis of pancreatic abscess. Clinical evidence of abscess was present in 85% of these patients. Two clinical patterns emerged during this series. First, in instances of severe pancreatitis with marked abdominal distention, hypotension and hypocalcemia, vigorous, aggressive supportive therapy often failed. Second, patients with acute pancreatitis responded well to conservative therapy but pancreatitis recurred within 10 days to 3 weeks later. Attention to clinical signs and symptoms and a high index of suspicion should allow for earlier operative drainage and improved patient survival. The importance of roentgenographic examination in confirming this diagnosis is stressed. The presence of gas bubbles within the abscess cavity on abdominal plain film gives strong support to this diagnosis. It is suggested that ultrasonography represents a significant development in the diagnosis of pancreatic abscess.

3920 MANAGEMENT OF THE PANCREAS AFTER PANCREATICODUODENECTOMY. *(E.)* Aston, S. J.; Longmire, Jr., W. P. (Univ. California Med. Sch., Los Angeles). *Ann. Surg.* 179(3):322-327, 1974.

A review was made of 65 patients (aged 3-84 yr) who had undergone pancreaticoduodenectomy in an effort to compare the different modes of management employe in their postoperative periods. Of the 65, carcinom of the head of the pancreas was diagnosed in 39, carcinoma of the ampulla of Vater in 16, and carcinoma of the distal common bile duct in 16. In 10 patient the continuity of the gastrointestinal tract was reconstructed by anastomosis of a large dilated pancreatic duct directly to the mucosa of the jejunum. In 5 patients with a small pancreatic duct, duct-to-mucosa anastomosis was also performed. In 38 patients pancreaticojejunostomy was performed end-to-end so that the cut end of the pancreas was invagina ed into the end of the jejunum. The anastomosis was performed between the capsule of the pancreas and th serosal surface of the jejunum. In 5 patients with a small pancreatic duct, the transected end of the pancreas was buried into an opening in the side of t jejunum with the bowel wall sewn down to the pancrea in two layers. The pancreatic duct was ligated and the transected end of the pancreas oversewn with interrupted sutures in 4 patients. In the final 3 patients, the entire pancreas was removed at the tim of pancreaticuduodenectomy. In this series pancreat fistulae were associated with 4 of the 9 operative deaths and were the most common cause of postoperative morbidity. In those undergoing pancreaticoduodenectomy with partial pancreatectomy, fewer postoperative problems occurred with a direct anastomosi between the pancreatic duct and mucosa of the jejunu When there is a large dilated pancreatic duct and a good duct-to-mucosa anastomosis can be obtained with the jejunum, this type of reconstruction is mos desirable. Total pancreatectomy is suggested for patients with multiple tumor nodules or a mass in

head of the pancreas with marked induration of the
creas distally, preventing localization of the
or. This procedure, however, does add the concern
permanent diabetic management to the postoperative
e.

21 SWEAT CALCIUM CONCENTRATIONS IN PATIENTS
WITH CYSTIC FIBROSIS OF THE PANCREAS AND
NORMAL CHILDREN. *(Ger.)* Hanggeli, C. A.
diatr. Clin., Univ. Bern, Switzerland). *Helv.*
diatr. Acta 28(6):611-615, 1973.

22 ABERRANT PANCREAS: REVIEW OF 11 CASES.
(Sp.) Rivas Rodero, S.; Escriva Escriva,
Tamarit Montesinos, L. (La Fe Munic. Sanitorium,
encia, Spain). *Rev. Esp. Enferm. Apar. Dig.*
1):37-44, 1974.

23 PAPILLARY CYSTADENOCARCINOMA OF THE PAN-
CREAS. *(E.)* Bilton, J. L.; Saddawi,
D.; Saigal, K. P.; Ram, M. D. (Huron Road Hosp.,
veland, Ohio). *Ohio State Med. J.* 70(4):236-238,
4.

4 CARCINOID TUMOR OF THE PANCREAS. ULTRA-
STRUCTURAL OBSERVATIONS OF A LYMPH NODE
ASTASIS AND COMPARISON WITH BRONCHIAL CARCINOID.
) Patchefsky, A. S.; Gordon, G.; Harrer, W. V.;
h, W. S. (Thomas Jefferson Univ. Hosp., Philadel-
a, Pa.). *Cancer* 33(5):1349-1354, 1974.

5 OCCULT ADENOCARCINOMA OF THE PANCREAS IN A
17-YEAR-OLD PATIENT WITH IMMUNOSUPPRESSED
KEMIA. *(E.)* Tavassoli, F. A.; Lynch, R. G.
(Washington Univ. Sch. Med., St. Louis, Mo.). *Gastroenterology* 66(5):1054-1057, 1974.

3926 PANCREATIC CARCINOMA. A REVIEW OF ETIOLOGIC CONSIDERATIONS. *(E.)* Mainz, D.; Webster, III, P. D. (Med. Coll. Georgia, Augusta). *Am. J. Dig. Dis.* 19(5):459-464, 1974.

3927 CYSTADENOMAS AND DEGENERATED PANCREATIC CYST: THREE CASES. *(Fr.)* Meley, J.; Morel, J.; Bourgne, M. (Bellevue Hosp., St. Etienne, France). *Lyon Chir.* 70(1):3-7, 1974.

3928 PLEOMORPHIC ADENOCARCINOMA OF THE PANCREAS. *(E.)* Guillan, R. A.; McMahon, J. (Topeka VA Hosp., Kan.). *Am. J. Gastroenterol.* 60(4): 379-386, 1973.

3929 MORPHOLOGICAL ASPECTS OF PANCREATIC DISEASE. *(Ger.)* Otto, H. F. (Path. Inst., Univ. Hamburg, Germany). *Dtsch. Med. Wochenschr.* 99(15): 767-770, 1974.

3930 PANCREATIC CUTANEOUS FISTULAS. *(E.)* Zinner, M. J.; Baker, R. R.; Cameron, J. L. (Johns Hopkins Med. Inst., Baltimore, Md.). *Surg. Gynecol. Obstet.* 138(5):710-712, 1974.

See also, 3611, 3624, 3628, 3631, 3637, 3650, 3805, 3824.

PANCREAS

Pancreatitis

1 HYPOTHERMIA, THROMBOSIS, AND ACUTE PAN-
CREATITIS. *(E.)* Savides, E. P.; Hoff-
nd, B. I. (Whittington Hosp., London, England).
Med. J. 1(5908):614, 1974.

ase of fatal hypothermia with acute pancreatitis
which pancreatic venous thrombosis occurred in
upper superior pancreatic duodenal vein and its
rapancreatic branches is reported. The patient,
5-yr-old woman, was admitted to the hospital
a state of confusion; her condition had been de-
iorating over a period of 4 months. In this pa-
nt, the thrombosis of the upper superior pancre-
coduodenal vein and its intrapancreatic branches
have been responsible for the pancreatitis ra-
r than secondary to it.

2 ACUTE PANCREATITIS SECONDARY TO CALCIUM
INFUSION IN A DIALYSIS PATIENT. *(E.)*
hgelerent, E. L.; David, D. S. (St. Luke's Hosp.
Ctr., New York, N.Y.). *Arch. Surg.* 108(2):218-219, 1974.

A 58-yr-old man with chronic end-stage renal disease secondary to severe hypertension and gout with renal lithiasis was placed on chronic hemodialysis. Several months later, the patient underwent an i.v. calcium infusion test to evaluate his parathyroid gland function; he received 15 mg/kg elemental calcium in the form of gluconate calcium in 5% dextrose in water. During the second hour of the test, the patient vomited spontaneously. Four hours after completion of the test, the patient complained of cramping upper abdominal pain that persisted and became more severe and penetrated to the back during the next 24 hr. This episode of acute pancreatitis was undoubtedly precipitated by the calcium infusion with subsequent hypercalcemia. It is expected that acute pancreatitis will be seen more frequently with increasing use of the calcium infusion test in patients with renal failure. Because of the high instance of morbidity and mortality associated with pancreatitis in the general population, the calcium infusion test should be performed with caution in uremic patients whose serum calcium levels are high normal. The dose of calcium given might also be decreased in these patients, and the test should be discontinued at the first sign of gastrointestinal distress.

3933 ACUTE PANCREATITIS SECONDARY TO IATROGENIC HYPERCALCEMIA: IMPLICATIONS OF HYPERALIMENTATION.

(E.) Manson, R. R. (Carle Fdn. Hosp., Urbana, Ill.). *Arch. Surg.* 108(2):213-215, 1974.

A 49-yr-old woman with a history of an enterocutaneous fistula which developed after a total abdominal hysterectomy and lysis of adhesions was placed on a regimen of 2 U/day of a hyperalimentation solution. Magnesium sulfate, gluceptatate calcium, sodium chloride, potassium chloride, potassium phosphate, and a multivitamin mixture were added to the solution. At various times throughout the next several months, hyperalimentation was discontinued; however, the regimen was reinstated each time because of nausea and continuous vomiting. After a period of months, the patient suffered an episode of acute pancreatitis, which occurred as a complication of hypercalcemia secondary to the calcium infusion. There is some evidence that hypercalcemia in itself may activate trypsinogen to trypsin causing pancreatitis. While calcium alone does not appear to activate pancreatic trypsinogen, in the presence of a small amount of trypsin, an increasing calcium ion concentration will permit the activation of a larger amount of trypsinogen to trypsin. This is believed to be the first report of pancreatitis secondary to acute hypercalcemia produced by chronic calcium intake as part of the hyperalimentation infusion.

3934 CHANGING METHODS IN THE TREATMENT OF SEVERE PANCREATITIS.

(E.) Feller, J. H.; Brown, R. A.; MacLaren Toussaint, G. P.; Thompson, A. G. (McGill Univ. Surg. Clin., Montreal, Canada). *Am. J. Surg.* 127(2):196-201, 1974.

A review was made of 200 patients with acute pancreatitis diagnosed by (1) a serum amylase level below 600 Somogyi units with typical clinical findings plus an elevated serum lipase or urinary amylase level or depressed serum calcium level; or (2) a serum amylase level above 600 Somogyi units with supportive clinical findings. Of these 200 cases, 83 were considered to have serious disease, in some of whom the serious nature of their states had not been initially recognized and therefore treatment directed against the development of major complications was not immediately started. It is noted that, in general, serum amylase levels did not relate directly to the severity of the disease. However, higher levels of amylase indicated mild pancreatitis or the presence of a pseudocyst. Serum calcium levels, however, proved valuable in both the initial evaluation of the patient's condition and the day to day response to therapy. Major complications encountered in this series included: nutritional depletion (83), abscess or acute pseudocysts (15), respiratory failure (18), and gross upper gastrointestinal bleeding (16). Treatment must be directed toward prevention of these complications if the patients are to survive. It is suggested that intravenous hyperalimentation be started as soon as possible. The use of an elemental type diet for means of nutritional support is employed as a sequel to the primary phase of i.v. hyperalimentatio For the complications of abscess or acute pseudocyst, simple external drainage is recommended. It i suggested that ultrasonic B scanning of the pancreas be used to detect the presence of fluid collections, and to determine with accuracy any change in size, thus aiding in the decision as to whether or not operative drainage is indicated. Peritoneal irrigation is extremely useful in the management of these complications in that patients improve when toxic material is washed out of the peritoneal cavity. Indications for operation in acute pancreatitis are: difficulty in diagnosis, deterioration in the patient's condition, and suspected pancreatic abscess or pseudocyst. Acute respiratory failure occurred as a complication in 18 patients and contributed to the death of 8 of these 18. Upper gastrointestinal bleeding occurred in 16 patients and responded in all but 1 case to treatment consisting of transfusions of whole blood as indicated and cold saline irrigation of the stomach at the site of bleeding. Early feeding of the elemental diet via a nasogastric tube may reduce the change of gastric mucosal hemorrhage.

3935 ACUTE HEMORRHAGIC PANCREATITIS IN THE DOG. I. THE ACTION OF BILE.

(E.) Schapiro, H. Britt, L. G.; Blackwell, C. F.; Gaines, K. J. (Univ. Tennessee Med. Units, Memphis). *Arch. Surg.* 107(4): 608-612, 1973.

Acute hemorrhagic pancreatitis was produced in 31 mongrel dogs by the closed-loop technique. In 14 of these dogs, bile was excluded from the duodenal loop while in the remaining 17, bile was allowed to enter the loop. The presence of bile in the closed duodenal loop seemed to increase the morbidity of the experimentally induced pancreatitis and to increase the rate of elevation in the serum alkaline phosphatase, LDH, and serum lipase levels. Pancreatic acinar tissue disruption appeared after 9 hr in the dogs with bile emptying into the closed loops and after 12 hr in the dogs with bile excluded. The presence of bile in the closed loop also increased the peritoneal fluid amylase concentrations, so that after 24 hr they were nearly twice as high as in the bile excluded dogs. The reflux of the duodenal contents into the pancreatic duct system may be the primary cause for the observed pancreatitis, and the addition of bile may serve as a catalyst to hasten the process.

3936 TRANSIENT HYPERTENSION WITH ACUTE PANCREATITIS.

(E.) Sankaran, S.; Lucas, C. E.; Walt, A. J. (Wayne State Univ. Sch. Med., Detroit, Mich.). *Surg. Gynecol. Obstet.* 138(2):235-238, 1974

The association of hypertension and pancreatitis has

n studied in 42 patients (33 males and 9 females,
n age 41 yr) with acute alcoholic pancreatitis.
3 cases there was a past history of hypertension,
none of these 3 patients had received antihyper-
sive medications. No antihypertensive medica-
ns were used during the course of treatment in
current hospitalization. Of the 42 patients,
developed transient hypertension during the acute
se of pancreatitis, i.e., the phase manifested
abdominal pain, tenderness, fever, leukocytosis,
hyperamylasemia. Their systolic pressures during
s phase ranged from 230 to 116 mm mercury; dias-
ic ranged from 160 to 60 mm. In 2 patients visual
turbances developed, apparently related to the
ertension they experienced, which cleared with
rovement of the pancreatitis. Of these 42 pa-
nts, 17 had been admitted prior to the present
dy for acute pancreatitis and all of them demon-
ated transient hypertension during the acute
se. These results indicate that the association
ween acute pancreatitis and transient hypertension
ears to be real. The 95% incidence of hyperten-
n during the acute phase of pancreatitis is sig-
icantly high. The clinical significance of tran-
nt hypertension with acute pancreatitis is not
ar. The blood pressure returned to normal in most
ients with improvement in the clinical status and
urn of the serum amylase level to normal. It was
t that the electrocardiographic findings may have
n related to previous hypotension or hypoxia, elec-
lyte imbalance, the effects of pain on the coron-
circulation, or circulating peptides. The
se of this associated hypertension also is un-
ar. It is suggested that the central nervous
tem lesions are a more important etiological fac-
in these patients than the pain they experience.
ohol, though a factor in the history of each of
se patients, did not likely cause the hyperten-
n, for hypertension persisted in these patients
er alcohol and its metabolites would have been
pletely eliminated from the body. None of the
ients in this series exhibited signs of respira-
y insufficiency. Fluid overload also did not
ear to be the cause of hypertension in these pat-
ts. It is suggested that transient hypertension in
se patients indicates the presence of circulating
oconstrictor substances in patients with acute alco-
ic pancreatitis.

7 RENAL VASOCONSTRICTION IN ASSOCIATION
WITH ACUTE PANCREATITIS. *(E.)* Werner, M.
Hayes, D. F.; Lucas, C. E.; Rosenberg, I. K.
yne State Univ. Sch. Med., Detroit, Mich.).
J. Surg. 127(2):185-190, 1974.

al function was evaluated in 11 patients in the
te phase of alcoholic pancreatitis and again
ing convalescence in 7 of these patients. Average
merular filtration rate, effective renal plasma
v, and true renal plasma flow were decreased
the acute phase. Osmolar clearance, amylase clear-
e, mean arterial blood pressure, renal vascular
istance, and total peripheral resistance rose in
acute phase. All parameters returned toward
mal with convalescence. These findings suggest
elease of a vasopressor during the acute phase of
creatitis. In one patient receiving a phentolamine infusion, improvement in systemic hemodynamics was apparent and the increase in urine volume suggested improved renal function. A marked reduction in both the true renal blood flow and the renal fraction of the cardiac output occurred. This indicated that the infusion had impaired the renal circulation and might have been deleterious if continued for a prolonged period. It is suggested that a direct infusion of the vasodilator into the renal arteries would have provided improvement in renal hemodynamics.

3938 IMPLICATIONS OF DIAGNOSTIC ULTRASOUND IN THE SURGICAL MANAGEMENT OF PANCREATIC PSEUDOCYSTS. *(E.)* Bradley, III., E. L.; Clements, Jr., J. L. (Emory Univ. Sch. Med., Atlanta, Ga.). *Am. J. Surg.* 127(2):163-173, 1974.

A group of 25 consecutive patients (5 females and 20 males, aged 12-64 yr) with a clinical diagnosis of pancreatic pseudocyst supported by history, abdominal mass or fullness, elevated serum amylase level, and confirmatory upper gastrointestinal series underwent preoperative examination by ultrasound. On 13 occasions the ultrasonic configuration of a cyst was present in agreement with the clinical impression. Subsequent exploration or autopsy confirmed the cyst in 10 instances, with the remaining patients not coming to exploration. However, in 13 other cases, solid tissue was predicted by ultrasound, not by clinical impression. Of these 13, 9 patients came to exploration or autopsy, and the ultrasound diagnosis was confirmed in 8, in each of whom the mass consisted of peripancreatic edema. This diagnostic method thereby avoids unnecessary exploration in these patients. It is noted, however, that if a cystic mass is closely adherent to the abdominal wall, ultrasound will still describe the cystic nature of the mass, but that separation of the cyst wall echoes from those resulting from normal abdominal wall structures may not be possible. It is also cautioned that, since cyst demonstration does not contain any histologic information, i.v. pyelograms as well as cholecystograms should be obtained in all patients when the mass presents in the right upper quadrant.

3939 CHRONIC CALCIFYING PANCREATITIS-CHRONIC ALCOHOLIC PANCREATITIS. *(E.)* Sarles, H. (Res. Unit Dig. Dis., INSERM, Marseille, France). *Gastroenterology* 66(4):604-616, 1974.

3940 CHANGES IN THE KININ SYSTEM OF BLOOD IN ACUTE PANCREATITIS. *(Rus.)* Savel'ev, V. S.; Usvatova, I. Ia.; Ognev, Iu. V.; Mitronov, I. A. (N. I. Pirogov 2nd Moscow Med. Inst., USSR). *Vestn. Khir.* 111(8):46-51, 1973.

3941 ON COMPLICATIONS OF ACUTE PANCREATITIS. *(Rus.)* Starodubtseva, L. N. (Rostov Med. Inst., USSR). *Vestn. Khir.* 111(8):41-46, 1973.

3942 ON DIAGNOSIS AND SURGICAL POLICY IN POSTOPERATIVE PANCREATITIS. *(Rus.)* Popov,

A. V.; Kirnos, A. E.; Popov, V. A. (S. M. Kirov Military Med. Acad., Leningrad, USSR). *Vestn. Khir.* 111(8):37-40, 1973.

3943 THE STATE OF THE LIVER IN PATIENTS AFTER SURGICAL THERAPY OF ACUTE CHOLECYSTOPANCREATITIS ACCORDING TO DATA OF RADIOISOTOPIC STUDIES. *(Rus.)* Strashinina, N. K.; Chupin, I. Ia. (Central Sci. Res. Inst. Roentgenol. Radiol., Leningrad, USSR). *Vestn. Khir.* 111(8):34-37, 1973.

3944 EXPERIMENTAL CALCIFYING PANCREATITIS. *(Ger.)* Klemm, G.; Putzke, H. P. (Med. Clin., Univ. Rostock, Germany). *Z. Gesamte Inn. Med.* 29(4):161-163, 1974.

3945 CHANGES OF AMYLASE IN KIDNEY DISEASE. *(Ger.)* Kratzsch, K. H.; Schirmer, K.; Franke, D.; Zimmermann, S. (Med. Clin., Chemnitz, Germany). *Z. Gesamte Inn. Med.* 29(4):163-164, 1974.

3946 SURGICAL TREATMENT OF PRIMARY CHRONIC PANCREATITIS. *(Fr.)* Grosdidier, J.; Boissel, P.; Richaume, B.; Guibal, F. (Univ. Hosp. Ctr., Nancy-Brabois, France). *Lyon Chir.* 70(1): 7-10, 1974.

3947 PROTEOLYTIC ENZYMES IN EXPERIMENTAL RAT PANCREATITIS. *(E.)* Huttunen, R. (Dept. Anat., Univ. Oulu, Finland). *Ann. Med. Exp. Biol. Fenn.* 51(4):133-138, 1973.

3948 PROTEINASE INHIBITION IN PLASMA DURING EXPERIMENTAL ACUTE RAT PANCREATITIS. *(E.)* Huttunen, R. (Dept. Anat., Univ. Oulu, Finland). *Ann. Med. Exp. Biol. Fenn.* 51(4):139-144, 1973.

3949 PANCREATIC ASCITES: CASE REPORT. *(E.)* MacGregor, I. L. (VA Hosp., San Francisco, Calif.). *N.Z. J. Med.* 79(509):690-691, 1974.

3950 SELECTIVE LOSS OF BETA CELL RESPONSE TO GLUCOSE IN CHRONIC PANCREATITIS. *(E.)* Kalk, W. J.; Vinik, A. I.; Bank, S.; Keller, P.; Jackson, W. P. U. (Univ. Cape Town, Med. Sch., South Africa). *Horm. Metab. Res.* 6(2):95-98, 1974.

3951 REMEDIABLE CHRONIC PANCREATITIS. *(E.)* Nardi, G. L. (Massachusetts Gen. Hosp., Boston). *Surg. Clin. North Am.* 54(3):613-620, 1974.

3952 EVOLUTIVE STUDY OF PANCREATIC LESIONS IN EXPERIMENTAL PANCREATITIS IN THE RAT. *(Por* Speranzini, M. B.; Franca, L. C. M.; Bartolomucci, A. C.; Hashimoto, T.; Widman, A.; de Oliveira, M. R. (Fac. Med., Univ. Sao Paulo, Brazil). *Rev. Hosp. Cli Fac. Med. Sao Paulo* 28(5):243-254, 1973.

See also, 3611, 3628, 3633, 3637, 3640, 3929, 4069.

LIVER AND BILIARY TRACT

3953 INFECTIOUS MONONUCLEOSIS IN CHILDREN: DIAGNOSTIC PROBLEMS DEALING WITH LIVER INVOLVEMENT. *(Ger.)* Peley, I.; Kadas, I.; Varga, L.; Labady, M. (Munic. Hosp., Pecs, Hungary). *Acta Paediatr. Acad. Sci. Hung.* 14(2):145-149, 1973.

Of 105 children with infectious mononucleosis, 93 had hepatosplenomegaly, 6 had hepatomegaly, 1 had splenomegaly, and 51 had abnormal liver function tests in addition to the characteristic symptoms of this disease. Liver function tests included thymol turbidity and serum transaminase activities and, in most cases, the BSP test and urine examination. In some cases the diagnosis had to be established indirectly by liver function tests and biopsy findings since the Paul-Bunnell reaction was positive in few of the children. This test was positive in only 3 of 54 children with normal liver function, in 1/5 of those with abnormal liver function, and in 4 of 16 patients who had pronounced hepatomegaly or jaundice. The higher percentage of positive Paul-Bunnell tests among children with abnormal liver function may be explained by (1) an erroneous diagnosis of infectious mononucleosis in those with less severe symptoms, (2) the relative insensitivity of the Paul-Bunnell test, or (3) this test may not necessarily be positive in children with infectious mononucleosis. Liver function tests normalized rapidly and the spleen and liver returned to their normal size in 14-21 days although in some patients they were palpable even after several months. Biopsies performed on the 16 patients with pronounced hepatomegaly or jaundice revealed marked inflammatory infiltration of lymphoid cells and, in contrast to viral hepatitis, an intact hepatic parenchyma; pronounced activity of Kupffer's cells was observed. These changes are similar to those found in adults with infectious mononucleosis.

3954 REYE'S SYNDROME: CLINICAL DIAGNOSIS AND TREATMENT WITH PERITONEAL DIALYSIS. *(E.)* Samaha, F. J.; Blau, E.; Berardinelli, J. L. (Univ. Pittsburgh Sch. Med., Pa.). *Pediatrics* 53(3):336-340, 1974.

Of 24 children with Reye's syndrome, each patient diagnosed as having acute hepatic encephalopathy was subjected to an hepatic coma regimen: glucose infusions were given in appropriate concentrations to

ntain the blood glucose at homeostatic levels.
addition, neomycin (100/mg/kg/day), saline enemas,
adrenal corticosteroid therapy (0.5-1.0 mg/kg/
dexamethasone) were administered. Of 11 patients
were also treated with peritoneal dialysis, 9
ed. Two of the 13 patients treated only with the
atic coma regimen lived. The data suggest that
n used before evidence of irreversible brain
m damage, peritoneal dialysis may offer hope in
ersing the high mortality of Reye's syndrome. Of
24 cases observed, there was good correlation
ween the typical clinical presentation with ab-
mal prothrombin time, SGOT, SGPT, and blood am-
ia levels and the abnormal liver histology des-
bed in Reye's syndrome. Thus, a medical history
routine laboratory data are all that is neces-
to recognize the syndrome.

5 SERUM ALPHA-FETOPROTEIN AND Ga^{67} CITRATE UPTAKE IN HEPATOMA.

(E.) Suzuki, T.;
sumoto, Y.; Manabe, T.; Honjo, I.; Hamamoto, K.;
zuka, K. (Kyoto Univ. Med. Sch., Japan). *Am.*
Roentgenol. Radium Ther. Nucl. Med. 120(3):
-633, 1974.

m α-fetoprotein (AFP) was assayed by the Ouchter-
and Mancini methods in 71 patients with liver
cinomas (27 hepatomas, 5 cholangiomas, and 39
static carcinomas of the liver); these patients
also subjected to scintiphotography with ^{67}Ga
ate. Serum AFP was detected in 17 patients with
toma. The hepatoma patients also showed in-
sed ^{67}Ga citrate uptake, this increase being
ter in the AFP-negative cases than in the AFP-
tive cases. ^{67}Ga uptake was not great in most
he patients with cholangioma or metastatic car-
mas of the liver, although uptake of the iso-
was increased in 2 of the latter cases. The
ee of ^{67}Ga concentration did not differ in he-
mas from cirrhotic and noncirrhotic livers.
, scintiphotography with ^{67}Ga citrate appears
e a useful screening method for hepatomas which
ot be identified by the AFP test.

LIVER GLYCOGEN IN MAN - THE EFFECT OF TOTAL STARVATION OR A CARBOHYDRATE-POOR FOLLOWED BY CARBOHYDRATE REFEEDING.

(E.)
son, Jr., L. H.; Hultman, E. (St. Eriks Hosp.,
kholm, Sweden). *Scand. J. Clin. Lab. Invest.*
):325-330, 1973.

teen healthy young human subjects were subjec-
to short-term (12-14 hr) or prolonged (1-3 days)
vation or were fed a carbohydrate-poor diet
owed by a carbohydrate-rich diet. Liver glyco-
was measured in specimens obtained by repeated
utaneous biopsies during this period. During
and following an overnight fast, there was a
decrease of about 0.30 mmol glucosyl U/kg wet
r tissue/min in the liver glycogen content dur-
4 hr further starvation. Prolonged starvation
aintenance on a carbohydrate-poor normocaloric
decreased the liver glycogen from a mean of
to 24-55 mmol glycosyl U/kg within 24 hr. During
dditional period of up to 9 days on the carbo-
ate-poor diet, the liver glycogen remained at
a low level. Refeeding with a carbohydrate-rich diet resulted in a rapid increase in liver glycogen to values exceeding the basal level (424-624 mmol glucosyl U/kg wet liver tissue).

3957 REYE SYNDROME. AN ASSOCIATION WITH TYPE 1 VACCINE-LIKE POLIOVIRUS.

(E.) Brunberg, J. A.; Bell, W. E. (David Grant Med. Ctr., Travis Air Force Base, Calif.). *Arch. Neurol.* 30(4):304-306, 1974.

Polio type 1 vaccine-like virus was isolated from the spinal fluid, ileum, and brain tissue of a 7-yr-old girl whose clinical course and postmortem findings indicated Reye syndrome. Her clinical history revealed previous immunization with seven courses of inactivated polio vaccine and close contact, 3 weeks prior to the onset of her illness, with a child recently immunized with oral trivalent attenuated poliovirus. The data suggest a causal relation between poliovirus infection and the patient's clinical illness, although it is possible that exposure to a recently immunized individual was followed by intestinal poliovirus colonization and subsequent dissemination of virus due to altered host resistance during the course of an independent disease. The patient's illness may have represented a complication of "contact" polio immunization. The data indicate that Reye syndrome is a nonspecific multisystemic response to a variety of agents.

3958 SAVINGS THROUGH THE DIRECT APPROACH TO JAUNDICE.

(E.) Del Guercio, L. R. M.; Mehta, M.; Kline, R.; Kuzmak, L.; Mattey, W. (St. Barnabas Med. Ctr., Livingston, N.J.). *Am. J. Surg.* 127(2):157-162, 1974.

The clinical and fiscal hospital records of 60 consecutive patients who underwent minilaparotomy for jaundice were analyzed for end results and cost effectiveness. The various diagnostic manipulations are performed through a 6-cm upper midline incision with the patient under local anesthesia. The procedure is carried out in an x-ray angiography room, and involves transhepatic cholangiography, liver biopsy, bile analysis, portal manometry, and omentoportography. This direct approach to jaundice is reserved for patients in whom the diagnosis is uncertain because of an atypical clinical course or confusing laboratory findings. When surgical jaundice is strongly suspected, the procedure is used preoperatively to assess the number and locations of stones, the extent of tumor invasion, and the degree of sphincteric spasm or stenosis. Among the 60 patients who underwent minilaparotomy, there were no mortalities, no need for blood transfusion, no evidence of bile leakage, and no episodes of septicemia. The procedure avoided formal laparotomy under general anesthesia in 48% of the patients. The exact tissue diagnosis was established in 62% of the patients in whom diseased tissue was present, and the anatomic diagnosis was made in 97% of the 60 patients. Hospital charges totaled \$95.00. The average savings that could have been achieved if the procedure had been carried out as soon as indicated was \$984.00.

3959 PLASMA AMINO ACIDS IN PATIENTS WITH HEPATIC ENCEPHALOPATHY: EFFECTS OF AMINO ACID INFUSIONS. *(E.)* Fischer, J. E.; Yoshimura, N.; Aguirre, A.; James, J. H.; Cummings, M. G.; Abel, R. M.; Deindoerfer, F. (Massachusetts Gen. Hosp., Boston). *Am. J. Surg.* 127(1):40-47, 1974.

The plasma amino acid patterns were studied in patients with advanced liver disease on protein-restricted diets or on hyperalimentation. In those patients on a protein-restricted diet, hepatic encephalopathy invariably occurred when the diet contained 40 g or more of protein; when protein was restricted to 20 or 25 g, the hepatic encephalopathy improved markedly. Infusions with amino acid solutions at rates greater than 45 to 50 g protein/24 hr were generally associated with a marked increase in hepatic encephalopathy without diminished hepatic function. In patients on protein-restricted diets, the amino acid patterns reflected excessive phenylalanine and methionine, mildly elevated tryptophan, lysine, glutamic acid, aspartic acid, ornithine, glycine, tyrosine, and serine, and decreased leucine, isoleucine, and valine. Infusions with essential amino acids failed to increase the persistently low concentrations of the branched chain essential amino acids, although phenylalanine and methionine were greatly elevated; the concentrations of many of the nonessential amino acids were reduced. Similar results were obtained following infusions of essential and nonessential amino acids, except that most nonessential amino acids remained highly elevated. Thus, patients with severe hepatic impairment appear to be generally incapable of utilizing phenylalanine and methionine. The deficient utilization of plasma phenylalanine may be detrimental to the patient with hepatic encephalopathy and coma.

3960 CLINICAL MANIFESTATIONS OF HEPATOMA. A REVIEW OF 6 YEARS' EXPERIENCE AT A CANCER HOSPITAL. *(E.)* Ihde, D. C.; Sherlock, P.; Winawer, S. J.; Fortner, J. G. (Mem. Sloan-Kettering Cancer Ctr., New York, N.Y.). *Am. J. Med.* 56(1):83-91, 1974.

Of 67 adults with histologically documented hepatocellular carcinoma, more than 70% presented with abdominal pain, right upper quadrant mass, and weight loss or ascites. Among the remainder, symptoms were suggestive of cholecystitis, deterioration in hepatocellular function, progressive pulmonary tumor, pathologic fracture of metastatic bone lesions, obstructive jaundice with pruritus, and chronic hepatitis. By the time of referral, nearly all patients showed evidence of single or multiple large intrahepatic masses detectable by physical examination, isotopic liver scan, or celiac arteriography. Alphafetoglobulin was present in 36% of the serum samples, while hepatitis-associated antigen was detected in none. Survival was brief among patients who could not be subjected to hepatic lobectomy, and death occurred among over 1/2 of the patients during the first hospital admission. Cirrhosis was observed in 69% of patients with adequate pathologic examination. Autopsies revealed extensive metastatic disease, primarily in the lungs, intraabdominal lymph nodes, adrenal glands, great veins adjacent to the liver, diaphragm, and skeleton. Tumor distribution most commonly involved the right and left liver lobes, the left lobe rarely being involved by itself. A second malignant neoplasm was documented in about 1/8 of the patients, and a few patients showed evidence of a variety of paraneoplastic syndromes. Death was most frequently due to hepatocellular failure, sepsis, or massive gastrointestinal bleeding.

3961 CLINICAL IMPLICATIONS OF MONOCLONAL GAMMOPATHY IN CHRONIC LIVER DISEASE. *(E.)* Slavin, S.; Zlotnick, A.; Levij, I. S.; Eliakim, M. (Hadassah Univ. Hosp., Jerusalem, Israel). *Digestive Dis.* 19(3):223-234, 1974.

An association between chronic liver disease and monoclonal gammopathy is described in 4 patients with chronic aggressive hepatitis progressing to cirrhosis, 2 with cryptogenic cirrhosis, and 1 with cholangiohepatitis. Three cases had cold precipitable IgG-IgM complexes; two of them manifested a syndrome of ulcerative purpura, Raynaud's phenomena, arthritis, neuropathy, encephalopathy, myopathy, and terminal glomerulonephritis. Two additional cases had occasional purpura, and in two other cases the gammopathy was asymptomatic. In one patient, monoclonal gammopathy developed from polyclonal gammopathy during the course of the disease, and transition to malignant lymphoma occurred several months later. Prednisone, ACTH, and azathioprine had no appreciable effect on the cryoglobulinemia. Two patients died of major vascular occlusions and glomerulonephritis 4 and 6 yr after onset of purpura; 2 other patients died of complications of liver disease (1 probably of hepatoma). In two cases, the monoclonal fraction disappeared or decreased with prednisone alone and prednisone and chlorambucil, respectively. It is possible that the presence of paraproteinemia in liver disease may not only precede the appearance of multiple myeloma or lymphosarcoma, it may also signal the development of hepatoma.

3962 GLYCOGEN STORAGE DISEASE TYPE IX: BENIGN GLYCOGENOSIS OF LIVER AND HEPATIC PHOSPHORYLASE KINASE DEFICIENCY. *(E.)* Schimke, R. N.; Zakheim, R. M.; Corder, R. C.; Hug, G. (Kansas Univ. Med. Sch., Kansas City). *J. Pediatr.* 83(6):1031-1034, 1973.

Case reports are presented on two male patients with glycogen storage disease type IX; the mothers of thes patients were sibs, indicating an X-linked inheritanc Examination of liver biopsy specimens from these patients indicated that the liver glycogen concentration was increased, while the liver phosphorylase activity was less than 10% normal. Total liver phosphorylase was normal, indicating that the low phosphorylase activity was not a result of phosphorylase deficiency. It was, rather, the result of diminished liver phosphorylase kinase activity. The addition of adenosine triphosphate and magnesium chloride to the patients' liver homogenates did not activate phosphorylase as it did in normal controls.

ivation of endogenous phosphorylase did occur with
further addition of purified kinase to the liver
ogenates. All other biochemical parameters were
mal. Glycogen concentration and phosphorylase
phosphorylase kinase activities in muscle speci-
s were normal, indicating that this X-linked form
glycogen storage disease type IX is not a gener-
zed disorder.

3 LIVER SNAPS AND THE DETECTION OF CLINICALLY
UNSUSPECTED LIVER METASTASES. *(E.)* Davies,
J.; Vernon, M.; Croft, D. N. (St. Thomas' Hosp.,
lon, England). *Lancet* 7852:279-280, 1974.

letermine the value of radioisotope liver imaging
the preoperative assessment of patients with
table cancer, liver images were obtained in 46
ients with carcinoma of the large bowel who did
have hepatomegaly. At operation or necropsy, 8
) were proved to have hepatic secondaries, and
er snaps produced by a gamma camera detected 7 of
e. The technique gave a correct answer in 44
ients, giving an overall accuracy of 95%. This
lence implies that liver imaging is useful in
preoperative assessment of patients with cancer,
if the liver is clinically normal. Of the 8
ients with liver metastases, 7 were dead within
nonths of operation, while over the same time
iod only 2 of those without liver secondaries died.

ULTRASTRUCTURAL FINDINGS WITH OSMIUM IM-
PREGNATION IN THE HUMAN LIVER DURING
ESTASIS. *(It.)* Barone, P.; Inferrera, C.;
ozza, G. (Inst. Anat. Pathol. Histol., Univ.
ina, Italy). *Boll. Soc. Ital. Biol. Sper.*
2):874-875, 1972.

ions of human liver from patients with chole-
is were stained with osmium by the technique of
nd and Murray and were examined by light and
tron microscopy. Under the light microscope a
ction was found in the number and area of Golgi
ratuses. An osmiophilic material, which was in-
reted to be bile, was present in bile capil-
es and the hepatocyte cytoplasm. Under the
tron microscope, intensely osmiophilic bile
mbi and fine osmiophilic granules were found in
ted bile capillaries. Large numbers of osmio-
ic granules were present in the endoplasmic re-
lum which was also greatly dilated. Changes in
Golgi apparatus consisted of accumulations of
k granules in the cisternae and vesicles on its
r side, but these granules were normal or only
htly osmiophilic. A reduction was observed
he osmiophilic area of the formative side. This
associated with distortion and fragmentation of
vesicles. Vesicles originating from the endo-
m or Golgi apparatus were filled with granular
rial and appeared to develop on the sinusoidal
of the cell since similar granular material was
d in Disse's spaces and/or in the cytoplasm of
vated Kupffer's cells. These findings suggest
bile, both inside and outside the hepatocyte,
s a positive test with osmium and that this
nique can be used to identify fine granules of
which cannot be detected by other methods.

3965 DIAGNOSIS OF GLYCOGEN STORAGE DISEASE TYPE I BY SERUM IMMUNODIFFUSION. *(E.)* Collipp, P. J.; Chen, S. Y.; Maddaiah, V. T.; Thomas, J.; Huijing, F. J. (Nassau County Med. Ctr., East Meadow, N.Y.). *Pediatrics* 53(1):71-75, 1974.

An antiserum was prepared by immunizing guinea pigs with a preparation of partially purified human liver microsomal glucose-6-phosphatase. Double agar diffusion and immunoelectrophoresis revealed that this antiserum reacted with an antigen in normal human serum, and also with serum from a child with glycogen storage disease, type III, i.e., debranching enzyme deficiency. No reaction occurred with serum or liver from patients with glycogen storage disease type I. While additional experience with this method is needed, it is nevertheless a potential method for establishing the diagnosis of type I glycogen storage disease without resort to liver biopsy.

3966 NATURAL HISTORY OF AUSTRALIA ANTIGEN AND HEPATOCELLULAR CARCINOMA. *(E.)* Nishioka, K.; Mayumi, M.; Okochi, K.; Okada, K.; Hirayama, T. (Natl. Cancer Ctr. Res. Inst., Tokyo, Japan). *Proc. 3rd Int. Symp. Princess Takamatsu Cancer Res. Fund (Japan)* 1973:137-146.

Immune adherence hemagglutination (IAHA), a highly sensitive method for detection of Australia antigen, and passive hemagglutination (PHA), a sensitive method for detection of Australia antibody, are used in large-scale seroepidemiological studies. In contrast to the results by the conventional immunoelectrosyneresis method, the results obtained by IAHA showed that the positive percentage increased 1.5% in the blood donors' group, and 2.7% in the hepatitis group. A remarkable increase in the positive rate, as high as 32.2%, was observed in the hepatocellular carcinoma group. Significantly higher frequency of Australia antigen positive cases was observed in the carcinoma groups as compared with control groups in various parts of Japan, in Taiwan, the Philippines, Singapore, and Kenya. A significantly greater number of patients with hepatocellular carcinoma have Australia antigen but in levels so low as to be detectable only by sensitive methods such as IAHA. Australia antigen positive hepatocellular carcinoma show much less lymphoid cell infiltration classified as inactive cirrhosis as compared with Australia antigen negative hepatocellular carcinoma with cirrhosis. This suggests that an impaired immunologic mechanism against Australia antigen is present among Australia antigen positive hepatocellular carcinoma cases. Clustering of Australia antigen in the cases of familial chronic liver diseases suggests the early transmission of hepatitis B virus from mother to child at an immunologically immature state. Studies indicate transmission of hepatitis B virus from an Australia antigen positive mother to child at the time of delivery or at an early neonatal stage, at a stage when children are considered to be at an immunologically immature state favorable for chronic Australia antigenemia with low immune responses as have been observed in many cases of oncogenic virus infection in experimental animals. Pathological examination has revealed that some type of primary carcinoma of the liver occurs in patients with chronic liver diseases and a close relation between liver cirrhosis and hepatocellular carcinoma has been observed. In Japan the relative risk of developing hepatocellular carcinoma was 22.6 times higher in Australia antigen positive persons than in Australia antigen negative persons when measured by the IAHA method. An antigen positive rate for healthy subjects among Taiwanese, Chinese (Singapore), Malays, Indians, and others closely paralleled the frequency of hepatocellular carcinoma in each ethnic group.

3967 ARTERIOHEPATIC DYSPLASIA. FAMILIAL PULMONARY ARTERIAL STENOSIS WITH NEONATAL LIVER DISEASE.

(E.) Watson, G. H.; Miller, V. (Roy. Manchester Children's Hosp., Manchester, England). *Arch. Dis. Child.* 48(6):459-466, 1973.

A new syndrome, called arteriohepatic dysplasia, is described. It features congenital pulmonary arterial stenosis, neonatal liver disease, and various facial and skeletal anomalies. The study was based on 5 famalies with 31 children, of whom 11 had liver involvement, 14 had cardiovascular abnormalities, and 9 had both conditions. The nature of the liver lesions varied widely, showing neonatal hepatitis, extra- or intrahepatic biliary atresia, or only a mild chronic impairment of function. Liver function tests in the children gave a variable pattern, in some a moderate rise in transaminases, in some a high phosphatase, suggesting biliary obstruction. In the patients, liver function appeared abnormal in only 2 of 8 tested. Labile systolic hypertension was unduly common in apparently affected parents, but none had clinical signs of peripheral systemic arterial stenosis. The familial tendency suggested autosomal dominant inheritance, with variable penetrance. A primary defect, perhaps not uniformly distributed in all the cases, in the hepato-canalicular region might account for all hepatic manifestations. The cases may support the theory that biliary atresia and neonatal hepatitis represent different phases of the same fundamental disease process.

3968 CYANOSIS IN CHRONIC LIVER DISEASE.

(Dut.) Schalm, S. W. (no affil.). *Tijdschr. Gastroenterol.* 15(6):385-388, 1972.

A 19-yr-old man with cryptogenic cirrhosis, esophageal varices, splenomegaly, and low WBC and platelet counts was splenectomized, but part of the left lobe of the liver had to be removed because of recurrent hemobilia after splenectomy. After 4 hr the patient developed dyspnea on exertion which increased in severity following recurrent gastrointestinal bleeding. With the exception of abnormal BSP retention, liver function tests were normal, as were pulmonary function tests and chest x-rays. Although the cardiac output was increased, all results of physical examination and catheterization of the heart were normal. On the basis of arterial and alveolar O_2 pressures, radioactivity over the liver in the lung scan, and detection of a direct communication between the pulmonary artery and vein with angiography using a catheter in the wedge position, a diagnosis of pulmonary arteriovenous shunts was established. Although it has been reported that rutin normalizes reduced capillary blood flow resulting from arteriovenous shunts, no change occurred in the arterial O_2 pressure when the patient was given 2 doses of 50 mg each of rutin i.v. Similarly no improvement was noted after administration of a 20 g protein diet and 6 g neomycin for 5 days. No trial of L-dopa was attempted.

3969 THE VALUE OF REGIONAL PERFUSION OF ANTIBIOTICS IN MULTIPLE LIVER ABSCESSES: ONE CASE.

(Fr.) Jaeger, A.; Farhat, M.; Gharbi, S.; Guibert, C.; Louppe, A. (Farhat Hached Hosp., Sousse, Tunisia). *J. Med. Strasbourg* 4(7/8): 551-554, 1973.

A 35-yr-old woman who was hospitalized with a tentative diagnosis of lithiasic cholangitis presented with a fever of 40 C, dehydration, slight hepatomegaly, and jaundice which did not respond to penicillin, colimycin, and kanamycin. At laparotomy many small abscesses, measuring 1-3 mm in diameter, were found on the surface of the liver and microabscesses were present inside. Since drainage of the abscesses was impossible and no calculi were found, a Kehr drain was inserted and the hepatic artery was catheterized *via* the gastroduodenal artery which had been ligated. Antibiotics were perfused directly into the liver. The patient's condition became worse despite perfusion of 20 M of penicillin and 80 mg of gentamicin in physiological saline every 24 hr. An anaerobic *Streptococcus* was isolated from cultures of pus, bile, and blood. Since this organis was sensitive to terramycin and thiamphenicol, these antibiotics were perfused in doses of 1 g and 2 g, resp., every 22 hr. The patient's condition improved and her bile became purulent 11 days after surgery. Six days later jaundice and signs of infection had regressed and perfusion of antibiotics was discontinued. However, the patient developed an intestinal fistula and died of circulatory collapse immediately after surgery. Partial autopsy confirmed that hepatic abscesses had completely disappeared and no obstructions were present in the biliary tract.

3970 LIVER FUNCTION IN HYPERTENSIVE PATIENTS MORE THAN 45 YEARS OLD.

(Rus.) Fesenko, I. P. (Chernigov Reg. Hosp., USSR). *Vrach. Delo* (2):58-60, 1974.

71 NEW METHOD FOR DETERMINING THE RESERVE FUNCTIONAL CAPACITY OF THE SMALL INTESTINE. *us.)* Rybakova, G. S.; Zlatkina, A. R.; Ugolev, M. (M. F. Vladimirskii Sci. Res. Clin. Inst., scow, USSR). *Ter. Arkh.* 45(8):44-47, 1973.

72 HEPATIC ARTERY LIGATION FOR TREATING LIVER TRAUMA. *(E.)* Iuchtman, M.; Freire, E. C. (Stadual Hosp., Rio de Janeiro, Brazil). *Am. rg.* 40(5):261-265, 1974.

73 LIVER MORPHOLOGY IN A CASE OF CITRULLINEMIA (A LIGHT AND ELECTRON MICROSCOPIC JDY). *(E.)* Mihatsch, M. J.; Riede, U. N.; nacker, H.; Wick, H.; Bachmann, C. (Univ. Basel, pt. Path., Switzerland). *Beitr. Pathol.* 151(2):)-207, 1974.

74 STRUCTURE AND COMPOSITION OF SULFATIDES ISOLATED FROM LIVERS OF PATIENTS WITH META- ROMATIC LEUKODYSTROPHY: GALACTOSYL SULFATIDE AND CTOSYL SULFATIDE. *(E.)* Sugita, M.; Dulaney, T.; Moser, H. W. (Eunice Kennedy Shriver Ctr., ltham, Mass.). *J. Lipid Res.* 15(3):227-233, 1974.

75 PRACTICAL VALUE OF DETERMINING SOME HISTOCHEMICAL REACTIONS IN INFLAMMATORY CON- TIONS OF THE LIVER. *(Pol.)* Stachura, J.; czudrawa, J.; Sowa, J. (Med. Inst., Cracow, Poland). *tol. Pol.* 24(3):360-364, 1973.

76 TREATMENT OF PATIENTS WITH HEPATIC TUMORS AND JAUNDICE BY LIGATION OF THE HEPATIC TERY. *(E.)* Larmi, T. K. I.; Karkola, P.; Klin- up, H.-E.; Heikkinen, E. (Univ. Central Hosp., Oulu, nland). *Arch. Surg.* 108(2):178-183, 1974.

77 HEPATOMA ASSOCIATED WITH ANDROGEN THERAPY FOR APLASTIC ANEMIA. *(E.)* Meadows, A. T.; iman, J. L.; Valdes-Dapena, M. (Children's Hosp., iladelphia, Pa.). *J. Pediatr.* 84(1):109-110, 74.

78 POLYCYSTIC LIVER DISEASE: STUDIES ON THE MECHANISMS OF CYST FLUID FORMATION. *(E.)* sher, J.; Mekhjian, H.; Pritchett, E. L. C.; iarme, L. S. (Ohio State Univ. Hosp., Columbus). *istroenterology* 66(3):423-428, 1974.

79 CAVERNOUS HEPATIC HEMANGIOMA IN THE NEWBORN INFANT: CASE REPORT OF A SUCCESS- L RESECTION. *(E.)* Somppi, E.; Niemi, K.; iuskanen, O.; Arajarvi, P.; Lauslahti, K. (Tampere ntral Hosp., Finland). *J. Pediatr. Surg.* 9(2): 39-242, 1974.

980 COMPARATIVE STUDIES ON HUMAN PLASMA MONOAMINE OXIDASE IN NORMAL SUBJECTS AND IN IBROTIC LIVER DISEASE. *(E.)* Ma Lin, A. W.-S.; Castell, D. O. (U. S. Naval Hosp., Philadelphia, Pa.). *Biochem. Med.* 9(4):373-385, 1974.

3981 HEPATIC PHOSPHORYLASE DEFICIENCY. ITS DIFFERENTIATION FROM OTHER HEPATIC GLYCOGENOSES. *(E.)* Fernandes, J.; Koster, J. F.; Grose, W. F. A.; Sorgedrager, N. (Sophia Children's Hosp., Rotterdam, Netherlands). *Arch. Dis. Child.* 49(3):186-191, 1974.

3982 CLEAR-CELL CARCINOMA OF THE LIVER. A CLINICOPATHOLOGIC STUDY OF 13 PATIENTS. *(E.)* Buchanan, Jr., T. F.; Huvos, A. G. (Mem. Sloan-Kettering Cancer Ctr., New York, N.Y.). *Am. J. Clin. Pathol.* 61(4):529-539, 1974.

3983 CURRENT STATUS OF EXTRACORPOREAL ASSISTANCE IN ACUTE LIVER FAILURE. *(Fr.)* Bloch, P.; Huguet, C.; Opolon, P.; Caroli, J. (no affil.). *Arch. Fr. Mal. App. Dig.* 63(1):55-62, 1974.

3984 SERUM ALPHA-FETOPROTEIN IN 184 UGANDAN PATIENTS WITH HEPATOCELLULAR CARCINOMA. CLINICAL, LABORATORY, AND HISTOPATHOLOGIC CORRELATIONS. *(E.)* Vogel, C. L.; Primack, A.; McIntire, K. R.; Carbone, P. P. (Grady Hosp., Atlanta, Ga.). *Cancer* 33(4):959-964, 1974.

3985 $^{99m}Tc_2S_7$ COLLOID LIVER SCINTIGRAPHY FOR THE EVALUATION OF DIFFUSE HEPATIC DISEASE. *(Jap.)* Aburano, T.; Suzuki, Y.; Hisada, K. (Sch. Med., Kanazawa Univ., Japan). *Jap. J. Nucl. Med.* 10(6):549-553, 1973.

3986 LEVODOPA TREATMENT IN HEPATIC COMA (WITH SPECIAL CONSIDERATION OF SERIAL EEG CHANGES). *(Ger.)* Lanzinger, G.; Kommerell, B. (Univ. Med. Clin., Heidelberg, Germany). *Dtsch. Med. Wochenschr.* 99(14):700-705, 1974.

3987 THE IMPORTANCE OF SELECTIVE HYPOTHERMIA OF THE LIVER IN SURGERY. *(Rus.)* Borzhievsky, T. K. (Lvov Med. Inst., USSR). *Vestn. Khir.* 111(10):50-54, 1973.

3988 THE LECITHIN-CHOLESTEROL ACYL TRANSFERASE SYSTEM IN HUMAN PLASMA IN PARENCHYMAL DISEASES OF THE LIVER. *(Ger.)* Adlkofer, F.; Forg, W. (Steglitz Clin., Free Univ., Berlin, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1384-1386, 1972.

3989 DISTURBANCES IN HEPATIC DETOXIFICATION IN 536 PATIENTS WITH HISTOLOGICALLY CONFIRMED FATTY LIVER. *(Ger.)* Korn, U.; Fischer, R.; Muting, D. (Kalk Clin. Liver Dis., Dig. Metabolic Dis., Bad Kissingen-Hausen, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1386-1389, 1972.

3990 PARTIAL HEPATECTOMY FOR HEMOPERITONEUM CAUSED BY RUPTURE OF A MALIGNANT HEPATOMA. *(It.)* Battistini, C.; Lampugnani, R. (Inst. Special Surg. Pathol. Clin. Propedeutics, Univ. Parma, Italy). *Policlinico (Chir.)* 80(1):35-40, 1973.

3991 ^{131}I-BSP BLOOD RETENTION TEST. 10 MINUTES AFTER INJECTION OF 20μCi OF ^{131}I-BSP. *(Jap.)* Maeda, T.; Ueno, K.; Aburano, T.; Hisada, K. (Sch. Med., Kanazawa Univ., Japan). *Jap. J. Nucl. Med.* 10(6):571-575, 1973.

3992 APPEARANCE OF CIRCULATING ALPHA-1-FETOPROTEIN IN ACUTE HEPATIC ATROPHY:PRELIMINARY RESULTS. *(Fr.)* Opolon, P.; Hirsch-Marie, H.; Gateau, P.; Caroli, J. (St. Antoine Univ. Hosp. Ctr., Paris, France). *Ann. Med. Interne (Paris)* 124(12):883-888, 1973.

3993 QUANTITATIVE CYTOLOGIC MEASUREMENTS IN HEPATOMAS. *(E.)* Gallagher, J. C. (VA Hosp., Bay Pines, Fla.). *Arch. Pathol.* 97(6):392-394, 1974.

3994 CHRONIC CHOLESTATIC HEPATITIS. *(Rus.)* Podymova, S. D. (I. M. Sechenov 1st. Moscow Med. Inst., USSR). *Sov. Med.* 8:99-105, 1973.

3995 THE RELATIONSHIP OF BIOLOGIC FALSE POSITIVE REACTIONS IN HEROIN DEPENDENCY TO LIVER FUNCTION. A ONE-YEAR FOLLOW-UP. *(E.)* Stimmel, B.; Tobias, H. (Mt. Sinai Sch. Med., City Univ. New York). *Am. J. Gastroenterol.* 61(3):195-200, 1974.

3996 LIVER DISEASE AND LIVER TUMOURS FROM THE DIAGNOSTIC POINT OF VIEW. *(E.)* McCready, V. R.; Barrett, J. J. (Roy. Marsden Hosp., Surrey, England). *Proc. R. Soc. Med.* 67(3):207-208, 1974.

3997 THE VASCULAR CONTENT OF HEPATIC LESIONS BY DUAL ISOTOPE SCANNING. *(E.)* Sephton, R. G.; Martin, J. J.; Andrews, J. T.; Steven, L. W.; Arkles, L. B. (Cancer Inst., Melbourne, Australia). *Aust. Radiol.* 17(4):406-410, 1973.

See also, 3471, 3497, 3517, 3521, 3621, 3627, 3632, 3643, 3644, 3646, 3659, 3662, 3807, 3809, 3942, 3985, 4008, 4013, 4016, 4046, 4105, 4106, 4112, 4117.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

3998 BREAST FEEDING AND SERUM BILIRUBIN VALUES DURING THE FIRST 4DAYS OF LIFE. *(E.)* Dahms, B. B.; Kraus, A. N.; Gartner, L. M.; Klain, D. B.; Soodalter, J.; Auld, P. A. M. (Cornell Univ. Med. Ctr., New York, N.Y.). *J. Pediatr.* 83(6): 1049-1054, 1973.

The relation between breast feeding and hyperbilirubinemia was studied in 199 breast-fed and bottle-fed infants during the first 4 days of life. Regardless of feeding regimen, breast- and bottle-fed groups had similar mean bilirubin values, and a similar low incidence of hyperbilirubinemia. Incidental findings included an 8% weight loss in infants who were breast fed without supplements, compared with a 4% weight loss in all other infants. Hyperbilirubinemia was not related to weight loss.

See also, 3528.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

3999 LIVER TRAUMA. CONSERVATIVE MANAGEMENT AND THE LIVER SCAN. *(E.)* Popovsky, J.; Wiener, S. N.; Felder, P. A.; Biramje, A.; Reydman, M. (Mt. Sinai Hosp., Cleveland, Ohio). *Arch. Surg.* 108(2):184-186, 1974.

4000 HEPATIC NUCLEAR AND NUCLEOLAR CHANGES IN ANANITA POISONING. *(E.)* Kisilevsky, R. (Dept. Pathol., Queens Univ., Kingston, Canada). *Arch. Pathol.* 97(4):253-258, 1974.

4001 CENTRILOBULAR PARENCHYMAL NECROSIS OF THE LIVER. A CONTRIBUTION TO THE KNOWLEDGE OF DRUG INDUCED LESIONS OF THE LIVER. *(Ger.)* Beckert, W. (Central Clin. Pulmonary Dis. Tuberculosis, Bad Berka, Germany). *Zentralbl. Allg. Pathol.* 117:219-226, 1973.

4002 ANESTHESIOLOGY GRAND ROUNDS YALE-NEW HAVEN HOSPITAL. "HALOTHANE HEPATITIS". *(E.)* Hehre, F. W.; Pschirrer, A. R.; Mason, B.; Davidson, D. (Yale-New Haven Hosp., Conn.). *Conn. Med.* 38(4):162-164, 1974.

4003 A CONTROLLED TRIAL OF HEPARIN THERAPY IN THE COAGULATION DEFECT OF PARACETAMOL-INDUCED HEPATIC NECROSIS. *(E.)* Gazzard, B. G.; Clark, R.; Borirakchanyavat, V.; Williams, R. (King's Coll. Hosp., London, England). *Gut* 15(2):89-93, 1974.

See also, 3994.

4 α_1-FETOPROTEIN AND LIVER-SPECIFIC ANTIGEN
IN VIRAL HEPATITIS TYPE B. *(E.)* Smith,
.; Barker, L. F. (U.S. Naval Hosp., Bethesda,
. *Arch. Intern. Med.* 133(3):437-439, 1974.

ial sera from 15 patients with viral hepatitis
B were tested for α_1-fetoprotein and liver-
ific antigen (F antigen) to determine the rela-
of these substances to the course of infection
to serum hepatitis B antigen (HBAg). α_1-Feto-
ein was present transiently, in concentra-
s between 50-150 ng/ml, in 11 patients, and F
igen was present transiently in 5 patients.
e were no differences in the occurrence of α_1-
protein or F antigen when icteric and nonicteric
ients were compared, nor when patients with
sient HBAg were compared with those who de-
ped persistent HBAg. The time of F antigen
ection coincided with probable hepatocellular
truction, whereas α_1-fetoprotein usually appeared
er when active hepatocellular regeneration might
ccurring.

5 ACUTE HEPATIC FAILURE TREATED BY CROSS
CIRCULATION. *(E.)* Burnell, J. M.; Runge,
Saunders, F. C.; Thomas, E. D.; Volwiler, W.
v. Washington Sch. Med., Seattle). *Arch. Intern.*
132(4):493-498, 1973.

ee experiences with cross circulation for the
eviation of hepatic coma in humans are reported.
of these patients survived and in none was there
major regeneration of the liver. In addition,
ross-circulation partner died from an acute
hylactic reaction attributed to antigens shared
previous cross-circulation donors. These cases
g the total number of reported cases of acute
tic necrosis treated by human cross circulation
21. Four of the previous patients have survived
out continuing evidence of chronic hepatic di-
se. Fourteen showed amelioration of the neuro-
ic symptoms and, of 11 patients autopsied, only
howed evidence of liver regeneration. Factors
ch appear to contribute to an unfavorable outcome
lude: a high incidence (9 of 21) of major gas-
intestinal hemorrhage; failure of the central
vous system to respond to treatment; a relatively
g period during which support may be required;
a high incidence of serious immunologic reac-
ns requiring support for longer than 5 days.
four human cross circulations for hepatic coma
ting 8 days or longer, there have been two deaths
donors resulting from immunologic reactions. Dis-
tinuation of clinical investigation into cross
culation with human donors is recommended until
ther research is conducted with animal models.

6 CYTOPLASMIC HEPATITIS B ANTIGEN IN "GROUND-
GLASS" HEPATOCYTES OF CARRIERS. *(E.)*
ziyannis, S.; Ferber, M. A.; Vissoulis, C.;
per, H. (Hippokration Gen. Hosp., Athens, Greece).
h. Pathol. 96(5):327-330, 1973.

er biopsy specimens were examined by immunofluor-
ence for hepatitis B antigen (HBAg) and by light microscopy. Two patterns of HBAg fluorescence were distinguished: 1) many hepatocytes with bright cytoplasmic HBAg-specific fluorescence in 19 out of 21 carriers with an essentially normal liver; and 2) few HBAg-containing hepatocytes, usually associated with HBAg in Kupffer cells in 9 patients with acute or chronic hepatitis and in 2 HBAg carriers with normal livers. Weak nuclear fluorescence was seen in addition in 3 patients with chronic hepatitis. On light microscopy 18 out of the 19 HBAg carriers with the first pattern of HBAg immunofluorescence contained hepatocytes with "ground-glass"-appearing cytoplasm. These characteristic cells appeared to be the HBAg-containing hepatocytes. Therefore, hepatocytes with ground-glass cytoplasm in an otherwise normal liver specimen should lead to the suspicion of a carrier state of HBAg.

4007 AN ELECTRON MICROSCOPIC STUDY OF THE STRUCTURAL POLYMORPHISM OF HEPATITIS B ANTIGEN. *(E.)* Hirschman, S. Z.; Schwartz, J.; Vernace, S.; Schaffner, F.; Ganz, C. (Mt. Sinai Sch. Med., City Univ. New York, N.Y.). *J. Infect. Dis.* 128(5):605-617, 1973.

Particulate hepatitis B antigen (HBAg), purified by several different methods, was suspended in buffers of various ionic strengths and pH and digested with peptidases, nucleases, and organic denaturing reagents. In water and dilute buffer 2 forms of HBAg predominated: tubes with cross-striations of 3-nm periodicity and small, solid round particles. The modal diameter of the small particles differed with the method of purification and the buffer. Ring forms of the round particles were very prominent in 0.125 M phosphate buffer and in 4 M urea. In phosphate buffer the tubes lost their cross-striations and seemed to uncoil. Large (40-80 nm) multistranded forms, with up to 4 lamellar-type strands, appeared in 0.125 M phosphate buffer and when HBAg was digested with 0.1% chymotrypsin. At acid pH tube forms disappeared and left mainly small round particles. It is proposed that the observed structural polymorphism of HBAg is dependent on protein-protein interactions. The small round particles may be disks of tightly wound helical protein that can stack to form tubes of various lengths.

4008 HEPATITIS IN SELECTIVE IgA DEFICIENCY. *(E.)* Benbassat, J.; Keren, L.; Zlotnic, A. (Hadassah Univ. Hosp. Med. Sch., Jerusalem, Israel). *Br. Med. J.* 4(5895):762-763, 1973.

Serum examinations by immunoelectrophoresis were performed over a 3-yr period in 2600 patients. Selective IgA deficiency was detected in 2 healthy subjects and in 10 symptomatic patients by immunoelectrophoresis of serum examinations. Five patients had hepatitis. In 3 of them the course of the disease suggested uncomplicated viral hepatitis. In the 4th the disturbance of the liver function disappeared only a yr after the onset of the disease; a liver biopsy specimen taken 7 months after onset was interpreted as compatible with chronic persistent viral hepatitis. The 5th patient had had acute hepatitis at the age of 8 yr. During the next 6 yr she remained jaundiced, with progressive splenomegaly and persistent disturbance in the liver function tests. The prevalence of selective IgA deficiency in this series was about 1:230. Selective IgA deficiency has been detected mainly among patients with recurrent infections, autoimmune disorders, or malabsorption, but also among asymptomatic individuals. IgA is believed to play an important part in protecting the gastrointestinal tract. Symptoms referrable to the gut, mainly malabsorption with steatorrhoea, have been observed in patients with selective IgA deficiency. It seems likely that a defect in the normal protective action of IgA in the alimentary tract, combined with a mild defect in humoral immunity, could result in a higher tendency to infections by viruses, the portal of entry of which is the gut.

4009 AUSTRALIA ANTIGEN AND THE IMMUNE RESPONSE IN HUMAN DISEASES. *(E.)* Sutnick, A. I. (Inst. Cancer Res., Philadelphia, Pa.). *J. Allergy Clin. Immunol.* 53(1):42-51, 1974.

Thirteen populations, many in the tropics, with a high frequency of persistent Australia antigen (Au) were investigated. There was a higher prevalence of persistent Au in males than in females, and an apparent relation between susceptibility to persistent Au and leukemia. Patients with Down's syndrome are a prototype for this susceptible group since they have a high frequency of persistent Au and an incidence of leukemia probably 150 times higher than that of a normal population. Data for 109 families (Italy and Melanesia) implied that the mechanism for development of persistent Au is by autosomal-recessive inheritance with a superimposed factor of maternal transmission. Comparison of mothers of leukemia patients with mothers of normal children showed that leukemia mothers had higher IgM, IgG, and antistreptolysin-O titers and history of cancer in the family. These mothers also had significantly lower monocyte counts, suggesting a host defense against transformed cells. Radioimmunoassay indicated the presence of Au-like activity in the leukemia mothers. The presence of persistent Au depends not only on susceptibility, but also on exposure to the agent. Frequency of persistent Au is higher in drug users and prisoners than in the normal population, higher in multiply transfused leukemia patients than in nontransfused leukemia patients, and higher in Down's syndrome patients in large institutions than in those living at home. Lepromatous leprosy and hepatoma patients have a higher frequency of persistent Au in countries with a high frequency of persistent Au among the normal population. Subtyping provides a method for distinguishing between the genetic hypothesis to explain family clustering of persistent Au and a hypothesis of simple infection within the family. Testing of 32 families in Bougainville revealed 11 different Au subtypes, thus ruling out the hypothesis that persistent Au results from intrafamilial infection alone.

4010 ANTIGENIC SUBTYPES OF HEPATITIS B ANTIGEN IN PANAMA. *(E.)* Peters, C. J.; Reeves, W. C.; Holland, P. V.; Alter, H. J. (Univ. Hosp., San Diego, Calif.). *Am. J. Epidemiol.* 99(5):375-380, 1974.

4011 DIAGNOSTIC DIFFICULTIES IN ICTERUS DIAGNOSED ERRONEOUSLY AS VIRAL HEPATITIS. *(Pol.)* Marczynska-Robowska, M.; Krajewska, B. (Acad. Med., Warsaw, Poland). *Pediatr. Pol.* 48(1):9-18, 1973.

4012 DIFFERENTIAL DIAGNOSIS OF INFECTIOUS AND SERUM HEPATITIS. *(Rus.)* Paktoris, E. A.; Sinaiko, G. A. (D. I. Ivanovskii Inst. Virol., Moscow, USSR). *Ter. Arkh.* 45(7):23-31, 1973.

4013 CHOLESTYRAMINE TREATMENT OF PATIENTS WITH INTRAHEPATIC CHOLESTASIS. *(Rus.)* Loginov, A. S.; Iartseva, A. M.; Kriukova, L. V. (All-Union Sci. Res. Inst., Gastroenterol., Moscow, USSR). *Sov. Med.* (8):90-94, 1973.

4014 AUSTRALIAN ANTIGEN, α-FETOPROTEIN AND CHROMOSOMAL ABBERATIONS IN CHRONIC LIVER DISEASE. *(Rus.)* Kantorovich, R. A.; Rozanova, L. B.; Semendiaeva, M. E.; Aprosina, Z. G.; Tur, V. M.; Tsvetkov, V. S. (N. F. Gamaleia Inst. Epidemiol. Microbiol., Moscow, USSR). *Sov. Med.* (8):85-90, 1973.

4015 ENZYMATIC PARAMETERS OF THE SMALL INTESTINE IN PATIENTS WITH ACUTE EPIDEMIC HEPATITIS, CHRONIC HEPATITIS AND LIVER CIRRHOSIS. *(Rus.)* Valenkevich, L. N. (Leningrad Pediatr. Med. Inst., USSR). *Ter. Arkh.* 45(8):52-56, 1973.

4016 SERUM GLYCOSOAMINOGLYCANS AND GLYCOPROTEINS IN VIRAL HEPATITIS AND JAUNDICE OF VARIOUS ETIOLOGIES. *(Rus.)* Baran, V. M.; Iusipova, N. A.; Balesnaia, A. N. (Minsk Med. Inst., USSR). *Ter. Arkh.* 45(7):35-38, 1973.

4017 SIGNIFICANCE OF FIBRIN STABILIZING FACTOR IN PATHOGENESIS OF HEMORRHAGIC MANIFESTATIONS IN VIRAL HEPATITIS. *(Rus.)* Zhitar, V. D. (Kishinev Med. Inst., USSR). *Ter. Arkh.* 45(7):38-43, 1973.

4018 BLOOD GLUCOSE CURVES AFTER GLUCAGON LOAD IN CHILDREN WITH CHRONIC IMPAIRMENT OF LIVER FUNCTION AND IN ACUTE PHASE OF INFECTIOUS HEPATITIS. *(Pol.)* Jablonska, A. (Acad. Med., Lublin, Poland). *Pol. Tyg. Lek.* 28(33):1257-1259, 1973.

4019 AUSTRALIA ANTIGEN AND ITS CLINICAL SIGNIFICANCE. *(Ger.)* Thamer, G. (Med. Clin., Univ. Heidelberg, Germany). *Dtsch. Med. Wochenschr.* 99(14):711-715, 1974.

4020 HEPATITIS-B ANTIGEN IN SALIVA, URINE AND TEARS. *(E.)* Vittal, S. B.; Dourdoure-

, D.; Steigmann, F. (Cook County Hosp., Chicago,
.). *Am. J. Gastroenterol.* 61(2):133-135, 1974.

1 VIRAL HEPATITIS: CLINICAL AND EPIDEMIO-
LOGICAL STUDY: 1966-1971. *(Sp.)* Guerrero,
A.; Hernandez, V.; Bermudex, R.; Paz, H. S.: Her-
dez, A. (Dept. Pediatr., Univ. Zulia, Venezuela).
. *Fac. Med.* 5(1/4):98-105, 1972.

2 PATHOGENESIS OF EXPERIMENTAL VIRAL HEPA-
TITIS (FIRST OF TWO PARTS). *(E.)* Sabesin,
M.; Koff, R. S. (Univ. Tennessee Coll. Med.,
phis). *N. Engl. J. Med.* 290(17):944-950, 1974.

3 THE CHARACTERISTICS OF A CHOLESTATIC VAR-
IANT OF EPIDEMIC HEPATITIS. *(Rus.)* Man-
ova, I. D.; Eitsen, E. F.; Rudneva, N. D. (Inst.
troenterol., Dushanbe, USSR). *Sov. Med.* (8):94-
1973.

4 PLASMA PHOSPHOLIPIDS IN THE COURSE OF HEPA-
TITIS. *(E.)* Kunz, F.; Rumpl, E.; Stum-
ll, W. (Dept. Intern. Med., Univ. Innsbruck,
tria). *Acta Hepatogastroenterol.* 20(6):452-
, 1973.

4025 DETECTION OF AUSTRALIA ANTIGEN IN URINE AND SALIVA. *(E.)* Tanno, H.; Fay, O.; Roncoroni, M.; Garcia, C.; Arnolt, R.; Katz, R. (Fac. Med., Univ. Natl., Rosario, Argentina). *Acta Gastroenterol. Lat. Am.* 5(3):125-128, 1973.

4026 ACUTE FULMINANT HEPATITIS. UNUSUAL NEUROLOGICAL SEQUELAE. *(E.)* Figueredo, R.; Patel, T. G.; Grosberg, S.; Langsam, A. (Brooklyn VA Hosp., N.Y.). *Arch. Intern. Med.* 133(5):832-834, 1974.

4027 PRESENCE OF HEPATITIS B ANTIGEN IN ASCITES FLUID FROM CIRRHOTICS WITH HB Ag POSITIVE SERUM. *(It.)* Cacciatore, L.; Molinari, V.; Guadagnino, V.; Tullio Cataldo, P. (2nd Fac. Med. Surg., Univ. Naples, Italy). *Boll. Soc. Ital. Biol. Sper.* 49(10):612-613, 1973.

See also, 3490, 3641, 3653, 3994.

LIVER AND BILIARY TRACT

Chronic Hepatitis

8 DANE PARTICLES IN THE SERA OF PATIENTS WITH
CHRONIC AGRESSIVE HEPATITIS. *(E.)* Yamada,
Kobayashi, T.; Tsuji, T.; Ohta, Y.; Kosaka, K.
ayama Univ. Med. Sch., Japan). *Tohoku J. Exp.*
. 111(1):93-95, 1973.

ctron microscope study showed Dane particles
sera of all 10 patients with Australia antigen-
itive chronic aggressive hepatitis. Massive Dane
ticles were demonstrated in sera of a patient at
early phase of the elevation of SGPT up to 2020
men U. The inner body of a Dane particle was
wn to have a typical icosahedral symmetry by the
ation technique.

29 HEPATITIS ASSOCIATED ANTIGEN (HAA), HL-A
ANTIGENS AND AUTO-LYMPHOCYTOTOXINS (CoCoCy)
CHRONIC AGGRESSIVE AND CHRONIC PERSISTENT HEPA-
TIS. *(E.)* Bertrams, J.; Reis, H. E.; Kuwert,
Selmair, H. (Inst. Med. Virol. Immunol., Univ.
sen, Germany). *Z. Immunitaetsforsch.*
5(4):300-307, 1974.

e incidence of hepatitis associated antigen (HAA),
stocompatibility antigens (HL-A), and cold-
ading complement-dependent lymphocytotoxins was
mpared in 77 patients with chronic aggressive
hepatitis and 51 patients with chronic persistent hepatitis. The HL-A antigen W 18 occurred with a normal frequency of 7.8% in chronic aggressive hepatitis patients but with a frequency of 25.5% in chronic persistent hepatitis patients. HAA occurred in 48% of the chronic aggressive hepatitis patients and in 72.6% of patients with chronic persistent hepatitis. The complement-fixation titer of HAA was significantly higher in the 37 HAA-positive chronic persistent hepatitis patients (mean 1:384) than in the 37 HAA-positive chronic aggressive hepatitis patients. Auto-lymphocytotoxins occurred significantly more often in patients with chronic aggressive hepatitis (48.1%) than in those with chronic persistent hepatitis (13.7%) or in 100 healthy controls (6%). The auto-antibody was demonstrated predominantly in undiluted sera and rarely exceeded a titer of 1:2 to 1:4. These results support the view that host response to HAA, which determines the clinical course of chronic hepatitis, is controlled by genetic factors. One of these factors may be linked to the histocompatibility antigen W 18.

4030 HEPATITIS-B-ANTIGEN IN CHRONIC LIVER DISEASES. *(Ger.)* Henning, H.; Tripatzis, I.; Braun, H. H. von; Luders, C. J. (Med. Coll.

Hannover, Germany). *Med. Klin.* 68:1503-1510, 1973.

4031 DETECTION OF CELLULAR IMMUNE PHENOMENA IN INFLAMMATORY LIVER DISEASES. *(Ger.)* Warnatz, H.; Scheiffarth, F.; Ruters, J.; Baenkler, H. (Univ. Hosp., Erlangen, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:919-922, 1972.

4032 CHRONIC ACTIVE LIVER DISEASE REEXAMINED: PROGNOSIS HOPEFUL. *(E.)* Summerskill, W. H. J. (Mayo Clin. Fdn., Rochester, Minn.). *Gastroenterology* 66(3):450-464, 1974.

4033 TREATMENT OF CHRONIC HEPATITIS. *(Ger.)* Dioguardi, N. (Inst. Med. Pathol., Univ. Milan, Italy). *Munch. Med. Wochenschr.* 116(13): 643-648, 1974.

4034 HISTOCHEMISTRY OF ARYLSULFATASE IN CHRONIC LIVER DISEASE. *(Fr.)* Bordeianu, A.; Nicolaescu, T.; Stoiculescu, P.; Bittman, E. (D. Danielopolu Inst. Normal Pathol. Physiol., Rumania). *Rev. Roum. Physiol.* 11(1):35-40, 1974.

See also, 4006, 4015, 4020, 4025.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

4035 CYTOPLASMIC CRYSTALLINE REGIONS IN HEPATOCYTES OF LIVER BIOPSY SPECIMENS. *(E.)* Burns, W. A.; Vander Weide, G.; Goldstein, L. I.; Chan, C. H. (VA Hosp., Washington, D.C.). *Arch. Pathol.* 97(1):43-45, 1974.

Cytoplasmic crystals in human hepatocytes were demonstrated in 2 patients with alcoholic liver disease and in 2 with drug hepatotoxicity attributed to isoniazid and nitrofurantoin, resp. The light microscopic and ultrastructural changes other than the crystals were variable in all cases. However, mitochondrial changes were present in all biopsy specimens and, in 1 case, the mitochondria contained a similar crystalloid type of inclusion. The crystals were found infrequently in the cytoplasm and had a sharp outline with no limiting membrane. The whole crystal measured 2.0 to 5.0 μ by 1.4 to 2.4 μ. Their periodicity gave the crystals a "herring bone" appearance in some sections. The nature of the crystals is unknown at present, but the molecular weight range is probably similar to large protein molecules, ribosomes, and viruses. Although only 13 previous cases of this entity have been reported, the finding of 4 cases in less than a year suggests the true frequency of these crystals might be proportional to the amount of material examined.

4036 MALLORY BODIES AND GIANT MITOCHONDRIA: TWO DIFFERENT STRUCTURES IN LIVER BIOPSIES FROM ALCOHOLICS. *(E.)* Bianchi, L.; Winckler, K.; Mihatsch, M.; Rohr, H. P. (Dept. Pathol., Univ. Basel, Switzerland). *Beitr. Pathol.* 150(3):298-310, 1973.

In selected liver biopsies from alcoholics, 2 types of cytoplasmic inclusions were found. Their distinct features are recognizable in light microscopy paraffin and semi-thin sections, also in ultrathin sections by electron microscopy. By alternating semi-thin and ultra-thin sections (Sandwich method) these "hyaline" inclusions have been classified as either true Mallory bodies Types I and II, or giant mitochondria with 2 forms, round and cigar-shaped. The 2 variants of Mallory bodies correspond to filamentous structures in electron microscopy and show differences only in matri density. The sharply defined round or cigar-shaped "hyaline" inclusions seen in light microscopy ultrastructurally always represent giant mitochondria which reveal no structural relation to Mallory bodies. It is suggested that the filaments of Mallory bodies are not derived from rough endoplasmic reticulum membranes. However, they may represent a protein produced by rough endoplasmic reticulum which cannot be utilized by the cell. Giant mitochondria are considered less specific for human alcoholic liver disease than are Mallory bodies.

4037 NATURAL HISTORY OF ALCOHOLIC HEPATITIS. IV. GLYCOSAMINOGLYCURONANS AND COLLAGEN IN THE HEPATIC CONNECTIVE TISSUE. *(E.)* Galambos, J. T.; Shapria, R.(Emory Univ. Sch. Med., Atlanta, Ga.). *J. Clin. Invest.* 52(11):2952-2962, 1973.

The extractable and nonextractable collagen and glycosaminoglycuranans (GAG) were estimated and characterized in 32 dried, defatted human livers obtained at autopsy from 10 nonalcoholic patients with no liver disease and 22 alcoholic patients with fatty liver (5), alcoholic hepatitis (7), and cirrhosis (10). Livers with alcoholic hepatitis or cirrhosis had significantly increased total and 1 N NaCl-extractable collagen. Only alcoholic hepatitis livers had significantly increased Tris-buffer-extractable GAG, but the amino acid composition of these GAG (proteoglycans) did not differ from that of normal livers. The major fraction of these GAG had isoelectric pH (pI) $\lesssim$ 3.1 in all livers. Livers with alcoholic hepatitis or cirrhosis had significantly increased nonextractable GAG. The major GAG fraction of all livers was chondroitin-4 or -6-SO$_4$. Alcoholic hepatitis livers had a significant increase of hyaluronic acid and an unidentified hyaluronidase-resistant GAG. Fatty livers showed no differences from normal ones. The data indicate that alcoholic hepatitis, but not fatty liver, is associated with significantly increased fibroblast activity. The changes in histologically "inactive" micronodular cirrhosis of alcoholic pa-

ts indicate continued activity of fibroblasts in
connective tissue of these cirrhotic livers.

MORPHOLOGICAL CHANGES IN THE LIVER OF
CHRONIC ALCOHOLICS WITHOUT INTERNAL DI-
ES AND THEIR DIAGNOSTIC EVALUATION. *(Ger.)*
zner, H.; Jaross, W.; Schentke, K. U.; Hanefeld,
Herrmann, V.; Fuchs, R. (Carl Gustav Carus Med.
Acad., Dresden, Germany). *Zentralbl. Allg. Pathol.* 117(3):274-281, 1973.

4039 HYPERLIPEMIA IN ALCOHOLICS. *(E.)* Barboriak, J. J. (Wood VA Hosp., Milwaukee, Wis.). *Q. J. Stud. Alcohol* 35(1):15-19, 1974.

See also, 3483, 3484, 3506, 3989.

LIVER AND BILIARY TRACT

Cirrhosis

) HEPATIC CIRRHOSIS: A CLINICO-PATHOLOGICAL
REVIEW OF 520 CASES. *(E.)* MacSween, R.
I.; Scott, A. R. (Western Infirm., Glasgow, Scot-
d). *J. Clin. Pathol.* 26(12):936-942, 1973.

linico-pathological review of 520 patients with
atic cirrhosis coming to necropsy at a Glasgow
pital between 1900 and 1969 is reported. There
been an overall increase in the incidence of
rhosis since the 1940's, and this is largely due
a rise in female incidence. A similar trend in
period 1940-1947 has been confirmed at a na-
nal level in data from the Annual Reports of the
ister General for Scotland. The mean age at
th has risen for both sexes. Etiologically, the
rhosis was alcoholic in 18.5% of the 520 patients,
ticteric in 10.4%, and cryptogenic in 61.9%; hemo-
omatosis was diagnosed in 7.5%. Primary malig-
t tumors of the liver supervened in 12.3%. Death
attributable to progressive hepatic failure in
cases, precipitate hepatic failure in 168,
nary malignant tumor in 65, and to other causes
122 instances. In 71.8% of the 238 cases for
ch postmortem liver tissue was available, the
rhosis pattern was macronodular or predominantly
ronodular/mixed. Among the 96 alcoholic cases,
histological pattern was macronodular in 65.1%.
s finding emphasizes previous observations that
h necrosis and collapse developing, micronodular
"nutritional" cirrhosis progresses to resemble
t seen in end-stage liver disease from various
ses.

1 HEMODYNAMIC VARIABLES AND PROGNOSIS FOL-
LOWING PORTACAVAL SHUNTS. *(E.)* Burchell,
R.; Moreno, A. H.; Panke, W. F.; Nealon, Jr.,
F. (St. Vincent's Hosp. Med. Ctr., New York, N.Y.).
g. Gynecol. Obstet. 138(3):359-369, 1974.

prognostic significance of large and small por-
flows was evaluated by direct measurements per-
med over a 10-yr period on 145 cirrhotic patients.
these patients 55 had an end-to-side portacaval
nt and 90 had a side-to-side anastomosis. Mean
tal flow in the 145 patients was 445 ml/min.
re were no correlations between the volume por-
flow and the incidence of encephalopathy, hos-
al mortality, or long-term survival. Pressure
ferences, estimates of total hepatic blood flow,
and splenoportographic findings did not approximate portal flow to any recognizable extent; additionally, they were of no value in predicting clinical course or survival rates after conventional portacaval decompression. Consequently, there is no justification in using these variables to classify patients into characteristic groups. Since the same rates of complications and survival occurred after diversion of either small or large portal flow, the data do not justify the use of portal flow as a criterion for selecting patients for new operations designed to preserve portal perfusion of the liver. If these operations can improve the clinical course, while still providing adequate portal decompression, they should be offered to all patients regardless of the magnitude of their flow.

4042 HEPATIC COMA IN CIRRHOSIS, PORTAL HYPERTENSION, AND FOLLOWING PORTACAVAL SHUNT: ITS ETIOLOGIES AND THE CURRENT STATUS OF ITS TREATMENT. *(E.)* Fischer, J. E. (Massachusetts Gen. Hosp., Boston). *Arch. Surg.* 108(3):325-336, 1974.

The pathogenesis of hepatic coma is discussed. The variety of conditions and situations which may result in hepatic encephalopathy has led to the concept of "increased cerebral sensitivity" in patients with chronic liver disease; the assumption is that toxins, presumably of gut origin, are responsible for the development of hepatic encephalopathy. Substances which have been implicated include various amino acids, ammonia, glutamine, short-chain fatty acids, serotonin, and false neurochemical transmitters. It is possible that all forms of hepatic coma are not caused by the same condition or substance. Severe hepatic coma may result from such factors as alcohol, the chronic absence of portal vein flow, or ornithine decarboxylase. Therapy of hepatic coma consists of removing the offending agent and, in situations where gastrointestinal tract hemorrhage is present, purging the tract of blood and controlling the hemorrhage. General supportive measures include maintenance of the fluid and electrolyte balance. Attention should also be given other possible causes of coma in patients with hepatic failure. Most established, effective therapy is directed at decreasing the protein load and "sterilizing" the intestinal contents. Forms of therapy that are not well established include various perfusion techniques, levodopa therapy, and liver transplantation. Future progress in the treatment of hepatic encephalopathy will depend primarily on the identification of the toxic factors responsible.

4043 THE ROLE OF HEMODYNAMIC MEASUREMENTS IN PORTOSYSTEMIC SHUNT SURGERY.

(E.) Reynolds, T. B. (Univ. Southern California Med. Sch., Los Angeles). *Arch. Surg.* 108(2):276-281, 1974.

Currently, preoperative hemodynamic measurements are of limited value in the selection of patients for portosystemic shunt surgery. Wedged hepatic vein pressure measurement accurately assesses portal pressure in alcoholic liver disease and can be helpful in the diagnosis and follow-up of portal hypertension but not in the selection of patients for surgery. Although theoretically useful, hepatic blood flow measurement has not been demonstrated to correlate with surgery results. New methods have been developed for the preoperative measurement of portal blood flow; these methods make use of the umbilical vein approach. Assessment of the hepatic arterial response to portal flow diversion is also feasible with the patient under local anesthesia. Hopefully, one of these measurements will prove useful in selecting those patients who can undergo portosystemic shunt without a high risk of postoperative encephalopathy or hepatic failure.

4044 THERAPEUTIC PORTACAVAL SHUNT. PRELIMINARY DATA ON CONTROLLED TRIAL AND MORBID EFFECTS OF ACUTE HYALINE NECROSIS.

(E.) Mikkelsen, W. P. (Univ. Southern California Sch. Med., Los Angeles). *Arch. Surg.* 108(3):302-305, 1974.

Of 69 alcoholic patients with cirrhosis, 35 were treated medically and the remaining 34 were treated surgically with a portacaval shunt. There have been 18 deaths in the medically treated group *versus* 9 in the surgically treated group. Recurrent encephalopathy occurred in 7 of the surgical patients and in none of the medical patients. There have been 121 separate bleeding episodes among the medically treated patients and 3 such episodes among the surgically treated patients. Of 40 additional patients with cirrhosis, 28 were treated via portacaval shunt. Among the 9 patients with or without a minimal degree of acute hyaline necrosis, operative mortality was within an acceptable range of about 4%. Progressive lethality occurred with increasing severity of the disease. Thus, it is recommended that a liver biopsy precede consideration of either an emergency or an elective shunt.

4045 CARBOHYDRATE INTOLERANCE IN IDIOPATHIC HAEMOCHROMATOSIS AND CIRRHOSIS OF THE LIVER.

(E.) Stocks, A. E.; Powell, L. W. (Dept. Med., Univ. Queensland, Brisbane, Australia). *Q. J. Med.* 42 (168):733-749, 1973.

The carbohydrate tolerance of 33 patients with hemochromatosis and 21 patients with cirrhosis from other causes was compared by studying their oral glucose tolerance and insulin sensitivity. Sixteen subjects with normal glucose tolerance and 27 with idiopathic diabetes mellitus were also studied. Sixty-three pe cent of the hemochromatosis patients and 57% of the cirrhosis patients had abnormal glucose tolerance, the derangement being more severe in the former. Th plasma insulin response to glucose (50 gm in 200 ml of water) was deficient and delayed in diabetes, excessive and delayed in cirrhosis, and relatively deficient but prompt in hemochromatosis. Insensitivity to i.v. insulin (0.1 U/kg) was more pronounced in hemochromatosis and cirrhosis than in idiopathic diabetes mellitus. There was no difference in insulin response or insulin sensitivity between untreate hemochromatosis patients and patients treated by venesection. However, one subject showed improvemen in carbohydrate tolerance with a greatly increased insulin response after iron depletion by venesection Five patients with iron overload without hepatic fibrosis had normal glucose tolerance and normal insulin response to glucose. The familial incidence of known diabetes in hemochromatosis was 24%. In contrast, 29% of the cirrhosis patients and 41% of the diabetic patients had a family history of diabetes. The vascular complications of diabetes were common in the diabetic and hemochromatosis patients, but uncommon in the cirrhosis patients. In patients with cirrhosis from any cause, there is insulin insensitivity, which is largely responsible for their carbohydrate intolerance. In hemochromatosis an additional factor is operative, and pancreatic damage from iron is more important than inheritance of the gene for diabetes.

4046 AUSTRALIA ANTIGEN AND ALPHA-FETOPROTEIN IN RELATION TO MORPHOLOGY OF CIRRHOSIS AND/OR HEPATOMA.

(E.) Sakurai, M.; Miyaji, T. (Osaka Univ Med. Sch., Japan). *Proc. 3rd Int. Symp. Princess Takamatsu Cancer Res. Fund (Gann,* 1973:127-135.

Morphological findings from autopsy cases on background liver with hepatoma suggest an impaired immun mechanism correlated with Australia antigen. The incidence of positive Australia antigen is twice as high in cirrhosis with hepatoma as in cirrhosis without hepatoma. Morphological examination of the background liver with hepatoma was carefully done under gross and light microscopes. Polymorphonuclear leuk cytic infiltration was thought most likely a secondar change due to terminal events. Activity of the cirrhosis was judged by lymphocytic infiltration in the stroma. If all types of cirrhosis are included, active cirrhosis indicated as positive lymphocytic infiltration shows that 13 of 15 cases (87%) are Austra lia antigen negative. If the cirrhosis appeared inactive, indicated as negative lymphocytic infiltration, 7 of 12 cases (58%) are Australia antigen positive. Seven of 9 cases (78%) of the Australia antigen positive cirrhosis are inactive and 13 of 18 cases (72%), of Australia antigen negative cirrhosis are active. Of the α-fetoprotein positive hepatoma cases 33% were Australia antigen positive.

4047 CELL-MEDIATED IMMUNE RESPONSE IN PRIMARY BILIARY CIRRHOSIS TO A PROTEIN FRACTION FROM HUMAN BILE.

(E.) Eddleston, A. L. W. F.; McFarlane, I. G.; Mitchell, C. G.; Reed, W. D.;

liams, R. (King's Coll. Hosp. Med. Sch., London, land). *Br. Med. J.* 4(5887):274-276, 1973.

l-mediated immune responses to a protein fraction uman bile were demonstrated, using the leucocyte ration test, in 8 out of 10 patients with primary iary cirrhosis but in only 3 out of 9 with active onic hepatitis. In the latter condition sensiti- ion to a liver-specific hepatocellular antigen found more frequently (5 out of 9 patients) than primary biliary cirrhosis (2 out of 10). These ults, as well as the granuloma formation observed tologically, suggest that the initial bile duct ion in primary biliary cirrhosis may be associated h a cell-mediated response to antigens, perhaps ived from bile duct epithelial cells, which may normal constituents of hepatic cells.

8 MAST CELLS IN HUMAN LIVER TISSUE: INCREASED MAST CELL NUMBER IN RELATION TO THE COMPO- TS OF CONNECTIVE TISSUE IN THE CIRRHOTIC PROCESS.) Murata, K.; Okudaira, M.; Akashio, K. (Univ. yo Sch. Med., Japan). *Acta Derm. Venereol. [Suppl.] ockh.)* 73:157-166, 1973.

hological changes of mast cells were studied in parison with the normal states in the connective sue of human liver. Liver specimens were obtained m 11 normal subjects and from 64 subjects who d of various liver diseases. Mast cells, which tained granules staining metachromatically as dish-purple with toluidine blue, were detected in interstitial connective tissue of human liver, the number of mast cells increased with pro- ssion of cirrhosis. In fatty liver, mast cells e observed more often in extended and widened riportal connective tissues than in the normal ver. Histochemical characteristics of mast cells e essentially similar to those found in normal ver. The increased number of mast cells was ated to proliferation of the liver connective ssue around the pseudo-lobuli, and was closely rrelated with active fibrogenesis. In advanced ty cirrhosis, the levels of hydroxyproline), was used as a parameter of collagen present, e more than double the contents in early stages increased more than 5-fold from normal liver ues. On the other hand, HP levels in liver ease in general showed no essential differences, even related to fibrotic changes, except for some HP increases in elderly patients which were due to development of fibrosis. Elevation of the acidic glycosaminoglycans was correlated with the advance of cirrhosis. Chondroitin sulfate isomers are mainly acidic glycosaminoglycans in normal liver tissue, whereas chondroitin sulfate B increases significantly with the progress of cirrhosis, at the advanced stage in particular.

4049 THE ORAL ARTERIAL AMMONIA TEST IN CIRRHOSIS OF THE LIVER, WITH A NOTE ON THE ROLE OF ESOPHAGEAL VARICES. *(E.)* Gips, C. H.; Que, G. S. (Clin. Internal Med., State Univ., Groningen, Netherlands). *Acta Hepatogastroenterol.* 21(1):20-25, 1974.

4050 SHORT-TERM TOLBUTAMIDE EFFECT ON PATIENTS WITH LIVER CIRRHOSIS. *(E.)* Hirayama, C.; Kawasaki, H.; Arimura, K.; Amagase, H. (Fac. Med., Kyushu Univ., Fukuoka, Japan). *Acta Hepatogastroenterol.* 21(1):34-40, 1974.

4051 ANALYSIS OF LIVER SCANS IN CIRRHOSIS FROM THE POINT OF VIEW OF SEGMENTAL STRUCTURE OF THE LIVER. *(Rus.)* Loginov, A. S.; Petrova, O. P. (Inst. Gastroenterol., Moscow, USSR). *Ter. Arkh.* 45 (8):40-44, 1973.

4052 PORTAL HYPERTENSION IN CHILDREN. *(Ger.)* Engert, J.; Meister, P.; Hecker, W. C.; Strassburg, R. (Childrens Hosp., Munich, Germany). *Z. Kinderchir.* 13(3):333-339, 1973.

4053 THE BOVINE HETEROGRAFT IN PORTACAVAL SHUNTS. *(E.)* Kerstein, M. D.; Lewis, J. W.; Roe, C. F.; May, C. J. (West Haven VA Hosp., Conn.). *Conn. Med.* 38(4):153-155, 1974.

See also, 3384, 3530, 3531, 3658, 4015, 4027, 4032, 4034.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

54 LEVELS OF CEFAZOLIN IN HUMAN BILE. *(E.)* Ram, M. D.; Watanatittan, S. (Huron Road sp., Cleveland, Ohio). *J. Infect. Dis.* 128:S361- 3, 1973.

biliary secretion of cefazolin was observed in 2 tients with radiological and clinically normal bil- ry tracts, 11 patients with cholelithiasis, chronic olecystitis, and radiological visualized gall- adders, 2 patients with cholelithiasis, chronic cholecystitis, and radiologically nonfunctioning gallbladders, and 1 patient with obstructive jaundice caused by pancreatic carcinoma. Cefazolin was excreted in the bile within 90 to 120 min after i.m. injection. In both the normal patients and the patients without obstructive biliary disease, the concentration of cefazolin in the bile was generally at least three times higher than the concentration in the serum. High cefazolin concentrations were also found in gallbladder tissue. Cefazolin may be useful in the treatment of biliary infections caused by susceptible bacteria.

4055 CHOLECYSTOKININ CHOLECYSTOGRAPHY IN ACALCULOUS GALLBLADDER DISEASE. *(E.)*
Nora, P. F.; McCarthy, W.; Sanez, N. (Northwestern Univ. Med. Sch., Chicago, Ill.). *Arch. Surg.* 108(4):507-511, 1974.

Symptomatic acalculous gallbladder disease presents a difficult therapeutic problem. Several patients with acalculous gallbladder disease had prolonged visualization of the gallbladder following oral cholecystography with iopanoic acid (3g) even after stimulation with a fatty meal. Cholecystectomy was performed on 14 of these patients. Over a follow-up period of 10 months to 5 yr, none had a subsequent attack of gallbladder colic. Next, cholecystokinin (75 Ivy U i.v. for 3 min) cholecystography was done on 19 other patients to detect abnormal function or the presence of disease. An abnormal response with deficient emptying was demonstrated in 10 of the 19 patients in whom cholecystectomy was done. The follow-up period has been 10 months or less, but none has experienced gallbladder colic. The operative and pathological findings for the 24 operated cases included: thickness of the gallbladder wall, kinking of the cystic duct, chronic cholecystitis, papilloma, and cholesterolosis. Cholecystokinin cholecystography added a dimension to the diagnosis of clinically important abnormal gallbladder function by providing maximum stimulus to contraction of the gallbladder that had been shwon by conventional cholecystography to empty very slowly.

4056 EFFECT OF CHLOROPHENOXYISOBUTYRATE ON LIPIDS IN SERUM AND HEPATIC BILE. *(E.)*
Saitoh, T.; Nakamura, N.; Takahashi, W.; Kobayashi, N. (Tohoku Univ. Sch. Med., Sendai, Japan). *Tohoku J. Exp. Med.* 110(4):341-345, 1973.

Changes in lipid concentration in serum and hepatic bile were investigated in patients with gallstones before and after treatment with chlorophenoxyisobutyrate (CPIB). After 14 days of 1.5 g/day CPIB treatment, there was no significant change in the cholesterol and phospholipid concentration in serum; the level of serum triglycerides was significantly reduced. Significant increase of cholesterol and phospholipid in bile was observed after 14 days of CPIB treatment. These results seem to indicate that CPIB increases the cholesterol and phospholipid levels in bile. It is suggested that CPIB, an inhibitor of cholesterol synthesis in the liver, may promote excretion of cholesterol into bile.

4057 EXCRETION OF CLINDAMYCIN IN THE BILE OF PATIENTS WITH BILIARY TRACT DISEASE. *(E.)*
Sales, J. E. L.; Sutcliffe, M.; O'Grady, F. (St. Bartholomew's Hosp., London, England). *Chemotherapy* 19(1):11-15, 1973.

Excretion of clindamycin in bile after p.o. administration was studied in 22 patients. Samples of bile were taken either directly from the gall-bladder and common duct or post-operatively from a T tube. Clind amycin was rapidly excreted in the bile, peak levels being found after 2 hr. High concentrations were found in the bile of the common duct and in those pat with radiologically functioning gallbladders. The gallbladder bile of those patients with radiological non-function was found to contain clindamycin but in a lower concentration than the functioning gallbladders. The penetration of clindamycin into the bile in radiologically non-functioning gallbladders in concentrations exceeding the minimum inhibitory concentrations for Salmonella suggests that a trial of its use in typhoid carriers would be justified.

4058 A STUDY OF CHOLECYSTECTOMY. *(E.)* Bremner, D. N.; McCormick, J. St. C.; Thomson, J. W. W.; McNair, T. J. (Chalmers Hosp., Edinburgh, Scotland). *Surg. Gynecol. Obstet.* 138(5): 752-754, 1974.

4059 RADIOCHOLECYSTOGRAPHY IN APPRAISING THE MOTOR FUNCTION OF THE GALLBLADDER. *(Rus.)*
Sivkov, I. I.; Rubin, M. P.; Prokhorov, V. V.; Troschilo, O. D. (I. M. Sechenov 1st. Moscow Med. Inst., USSR). *Sov. Med.* (8):73-78, 1973.

4060 AGENESIS OF THE GALLBLADDER, MALROTATION OF THE GUT, AND HORSESHOE KIDNEY. A NEW SYNDROME? *(E.)* Bietz, D.; Dillard, D. (Univ. Washington Med. Sch., Seattle). *Am. J. Surg.* 127(5):596-598, 1974.

4061 BILE ASCITES IN INFANCY: DIAGNOSIS WITH ^{131}I-ROSE BENGAL. *(E.)* Hansen, R. C.; Wasnich, R. D.; De Vries, P. A. (Stanford Univ. Hosp., Calif.). *J. Pediatr.* 84(5):719-720, 1974.

4062 THE ROLE OF PHOSPHOLIPASE A IN GALLSTONE FORMATION. *(E.)* Goswami, S. K.; Frey, C. F. (Wayne County Gen. Hosp., Eloise, Mich.). *J. Surg. Res.* 16(2):162-163, 1974.

4063 SPHINCTEROTOMY AND POSTOPERATIVE CHANGES IN THE WIDTH OF COMMON BILE DUCT. *(Pol.)*
Poltorak, J. L. (Bielanski Hosp., Warsaw, Poland). *Pol. Tyg. Lek.* 28(42):1636-1638, 1973.

4064 BACTERIA IN THE BILIARY TRACT. A STUDY OF THEIR FREQUENCY AND TYPE. *(E.)* Kune, G. A.; Schutz, E. (Roy. Melbourne Hosp., Australia). *Med. J. Aust.* 1(8):255-258, 1974.

4065 BILE ACID METABOLISM IN INFANTS AND CHILDREN. *(E.)* Murphy, G. M.; Signer, E. (Inst. Child Health, Birmingham, England). *Gut* 15(2):151-163, 1974.

COMPLETE TRANSECTION OF THE COMMON BILE DUCT DUE TO BLUNT TRAUMA. *(E.)* Turney,
; Lee, J. P.; Raju, S. (Univ. Mississippi Med.
Jackson). *Ann. Surg.* 179(4):440-444, 1974.

ARE SILICONE RUBBER T-TUBES BETTER THAN LATEX RUBBER TUBES IN THE COMMON BILE DUCT?
SUS MONKEY MODEL. *(E.)* Nundy, S.; Bell, G.
owley, D. J.; Melrose, D. G. (Hammersmith Hosp.,
n, England). *Br. J. Surg.* 61(2):206-208, 1974.

CHANGES IN THE CARDIOVASCULAR SYSTEM IN ACUTE CHOLECYSTITIS. *(Rus.)* Shapot, Iu.
. I. Dzhanelidze Sci. Res. Inst. First Aid,
grad, USSR). *Vestn. Khir.* 111(8):31-34, 1973.

CLINICAL COURSE AND PATHOGENESIS OF AGENESIS OF THE GALLBLADDER. *(E.)* Prexl, H.
urg. Clin., Univ. Graz, Austria). *J. Abdom.*
16(3):73-74, 1974.

4070 FREQUENCY OF CHOLEDOCHOLITHIASIS IN 3155 CHOLECYSTECTOMIES. *(Ger.)* Klug, W. (St. Joseph Stift Hosp., Dresden, Germany). *Z. Gesamte Inn. Med.* 29(6):242-245, 1974.

4071 ACUTE CHOLESTASIS SYNDROME IN ACUTE EXACERBATIONS OF CHRONIC CHOLECYSTITIS. *(Ger.)* Keclik, M.; Huslarova, A.; Skachova, J.; Uhlir, Z. (Med. Clin., Charles Univ., Prague, Czechoslovakia). *Z. Gesamte Inn. Med.* 29(6):240-242, 1974.

4072 DIAGNOSIS BY RETROGRADE ENDOSCOPIC CHOLANGIOGRAPHY. *(E.)* Shapiro, H. A.; Carlson, R. (Dept. Med., Univ. California, San Francisco). *Gastroenterology* 66(4):824, 1974.

See also, 3470, 3477, 3478, 3491, 3496, 3520, 3535, 3612, 3631, 3636, 3639, 3642, 3643, 3645, 3652, 3653, 3654, 3655, 3657, 3659, 3663, 3665, 3669, 3670, 3943, 4078, 4241.

GENERAL

ISOLATION OF CANDIDA SPECIES FROM THE GASTROINTESTINAL TRACT IN MALNOURISHED CHIL-
. *(E.)* Gracey, M.; Stone, D. E.; Suharjono;
o (Princess Margaret Children's Med. Res. Fdn.,
, Australia). *Am. J. Clin. Nutr.* 27:345-349,

ates of isolation of various species of *Candida*
gastric and small intestinal contents were
ed in 3 groups of patients: 27 relatively well-
shed Australian children of Caucasian extrac-
, and 2 groups in which malnutrition is endemic
ustralian aboriginal children and 27 Indonesian
ren). The rate of isolation of *Candida* species
ignificantly increased in the gastric and intes-
contents of the malnourished children. The
es of *Candida* found in the 3 groups differed
ly. Isolation of the known pathogen *C. albi-*
was uncommon in well-nourished children; *C.*
calis and *C. parapsilosis* were predominant in
alnourished children. The reasons for these
rences are obscure and may be related to genetic
vironmental differences or to undetermined se-
e of malnutrition. Impaired immunological sur-
ance in the malnourished children may play a
ficant role. It is noted that the increased
ence of *Candida* species in the gut of these
ren may contribute to the problem of diarrhea
lnutrition.

AETIOLOGICAL SIGNIFICANCE OF VIRUSES AND ROLE OF LYMPHOCYTES IN CERTAIN GASTROIN-
NAL DISEASES. *(E.)* Nasz, I.; Kulcsar, G.; Dan,
Sallay, K.; Vertes, L.; Geck, P.; Keskeny, S.;
ath, J. (Semmelweis Univ. Med. Sch., Budapest,
ary). *Acta Microbiol. Acad. Sci. Hung.* 20(3):
203, 1973.

oximately 10,000 preparations from nearly 500
ents and healthy controls were examined. Cells of scrapings of oral ulcers and lymphocytes were studied with immunofluorescence and the lymphocyte transformation test, as well as with the rapid swelling reaction of lymphocytes under viral effect. Adenovirus and herpesvirus antigens were significantly more often detected in the lymphocytes of aphthous patients than in controls. Frequently the simultaneous presence of the 2 types of virus was observed in both cell types of the same patient. A positive lymphocyte transformation reaction with type 1 adenovirus was noted in about 2/3 of the patients. Similar results with herpesvirus were noted in 1/2 the patients. A similar incidence was found with the rapid lymphocyte swelling reaction. In the 14 patients with ulcerative colitis, the lymphocyte transformation test was 36.4% positive with the latent adenovirus types 1, 2, 5, and 6 while with herpesvirus this rate was 17% in 10 patients with hepatic cirrhosis and 20% in 10 patients with diabetes mellitus, which refers to a sensitivity of the cells to those viruses. In contrast, only 6-8% positive results were seen in patients with other diseases and healthy persons. Such results suggest that viruses or virus antigens and lymphoid cells may be important in the development of chronic and recurrent digestive tract diseases of unknown etiology. The simultaneous presence of adeno and herpesvirus antigens may be connected with these diseases and their recurrence. Virus-induced disturbances of the immune reaction may be important. In the cases in this series cellular immunity appeared to be disturbed. As the epithelial cells of the mucosa and lymphoid cells are connected, viruses causing periodic diseases are released from the mononuclears into epithelial cells and induce recurrences or may be significant in disturbing cellular immunity. When the lymphoid cells carrying the virus or viral gene cease to control their oncogenic effect, the disease which, up to then, had been recurrent or chronic in its features, turns into a malignant disease.

4075 ANTITOXIN RESPONSES TO INFECTIONS WITH ENTEROTOXIGENIC ESCHERICHIA COLI. *(E.)*

Sack, R. B.; Jacobs, B.; Mitra, R. (Baltimore City Hosp., Md.). *J. Infect. Dis.* 129(3):330-335, 1974.

Titers of antitoxin to the enterotoxins of *Escherichia coli* and *Vibrio cholerae* were determined in acute and convalescent sera from 23 patients with acute cholera-like diarrhea in Calcutta, India. The adult rabbit ileal loop model was used for titration of antitoxin. Of 8 patients harboring enterotoxigenic *E. coli*, 6 developed 4-fold or greater rises in titer of antibody to *E. coli* enterotoxin. Similar findings were noted in 4 of 10 patients who were bacteriologically negative. Of 6 patients with cholera, 5 also showed significant rises in antitoxin titer against the *E. coli* enterotoxin, suggesting extensive immunologic cross-reactions between these 2 enterotoxins. In 2 of the cholera patients the existence of dual infection suggested the possibility that an interaction between *V. cholerae* and *E. coli* was occurring in the jejunum with passage of an enterotoxin-mediating plasmid. These studies suggest that antibodies to enterotoxin are regularly formed after infection with enterotoxigenic *E. coli*, and that antitoxin assays might be useful in making retrospective diagnoses of disease caused by these organisms in areas in which cholera is not endemic.

4076 USE OF CHEMICALLY DEFINED DIETS IN THE MANAGEMENT OF PATIENTS WITH HIGH OUTPUT GASTROINTESTINAL CUTANEOUS FISTULAS. *(E.)*

Rocchio, M. A.; Mo Cha, C.-J.; Haas, K. F.; Randall, H. T. (Rhode Island Hosp., Providence). *Am. J. Surg.* 127(2):148-156, 1974.

In 37 patients with gastrointestinal cutaneous fistulas, a major effort was made to maintain nutrition throughout the emergency period. In 26 patients i.v. nutrition was followed by the use of a chemically defined elemental diet. In the remaining 11 cases the elemental diet was the initial method used to provide nutrition. Inflammatory bowel disease was associated with the fistulas in 10 cases, abdominal trauma in 3, and peptic ulcer in 3. Malignant lesions were directly associated with the fistulas in 11 cases. It is essential that the diet introduced into the stomach or a segment of the small bowel be gradual and continuous. Initial concentration must not exceed 10-15% weight/volume of a high nitrogen diet in the adult and should be less in children. Adult patients should receive 40-60 ml/hr at first, with the concentration and volume gradually increasing over 3 to 4 days, with monitoring of the blood and urine glucose and electrolytes, until 45 to 60 calories/kg/day are tolerated. Vitamin supplementation, including vitamin K and probably folic acid, is needed. In this series 24 patients had spontaneous closure, which included 7 of 12 proximal fistulas, 8 of 16 small bowel fistulas, and all 9 colonic fistulas. Surgical closure was needed in 6 patients. There were 6 deaths, 4 from cancer, 1 from infarction of additional small bowel and 1 due to massive hemorrhage of the gastrointestinal tract.

4077 RADIOLOGICAL CHANGES IN THE DISTAL PART OF THE ILEUM IN ASSOCIATION WITH YERSINIA ENTEROCOLITICA INFECTIONS. *(E.)*

Van Wiechen, P. J. (Univ. Hosp., Leiden, Netherlands). *Radiol. Clin. Biol.* 43(3):242-253, 1974.

Three women (aged 23-34 yr) presenting symptoms suggestive of Crohn's disease required radiological examination of the small intestine using the enteroclysis procedure. In 2 of the patients, the history of cramp-like abdominal pains was short, 4 weeks, and in the other the pain commenced after an appendectomy 2 years earlier. In each case radiological examination showed changes in the mucosa of the ileum, limited to the terminal 20 cm. Filling-defects were noted, a few with a diameter of 5-7 mm, which were probably based on hyperplasia of lymphoid tissue. The mucosal folds, showing a very tortuous course, were increased in number and noticeably broadened. The distance between the distal ileum and the adjacent cecal loops was increased. Both the broad folds and the increased distance between intestinal loops were due to inflammatory edema in the circular folds and the intestinal wall, resp. Only sometimes did the filling-defects resemble the cobblestone appearance common in Crohn's disease. Furthermore, in Crohn's disease, there is no increas in the number of mucosal folds. The radiological findings in these patients were also distinctly different from those of nodular lymphoid hyperplasia in which the filling-defects are regularly arranged and rarely exceed a diameter of 1-3 mm. It is stressed that a diagnosis of *Yersinia enterocolitica* infection be considered when cases present with a brief and not entirely typical history for Crohn's disease diagnosis. Enterocolysis of the small intestine should be considered for these cases since conventional radiography with an oral contrast medium does not ensure optimal filling of the distal ileum. A literature review demonstrated that a *Yersinia* infection can also be involved when the symptoms suggest acute appendicitis.

4078 CARCINOID MYOPATHY AND TREATMENT WITH CYPROHEPTADINE (PERIACTIN). *(E.)*

Berry, E. M.; Maunder, C.; Wilson, M. (Hammersmith Hosp., London, England). *Gut* 15(1):34-38, 1974.

Laparotomy in a 47-yr-old woman with flushing attack and diarrhea revealed white deposits throughout the liver and gallbladder. Histology was of an argentaffin carcinoma and the primary was from the gallbladder. Over the next 2 yr the patient developed pulmonary stenosis, the diarrhea and flushing attacks became more severe, and proximal limb and girdle weakness occurred. Biopsy of the right infraspinatus muscle showed advanced atrophy of type II muscle fibers but no inflammation. Perinuclear acid phosphatase was increased. Electron microscopy revealed persistence of the Z-line with severe muscle fiber disruption similar to that observed in animals injected with 5-hydroxytryptamine (5-HT). Blood 5-HT in the patient was 2.0 μg/ml. *p*-Chlorophenylalanine (up to 4 g/day) was ineffectiv in controlling the diarrhea. However, adding cyproheptadine (16-32 mg/day) controlled the diarrhea and

uced symptomatic improvement in muscle power.
ovement in control of diarrhea has been maintained
over 10 months on cyproheptadine alone. The
athy was apparently a nonmetastatic complication
he carcinoid tumor or was caused directly by
ulating 5-HT.

NEONATAL NECROTIZING ENTEROCOLITIS:
CLINICAL AND RADIOLOGICAL FEATURES. *(E.)*
, S. A.; Friedland, G. W. (Stanford Univ. Sch.
, Calif.). *West. J. Med.* 120(2):110-115, 1974.

trospective study was made of the clinical and
ological findings, therapy and prognosis in 10
en cases of neonatal necrotizing enterocolitis
nosed over a 3-year period. Only 3 of the
ers had no prenatal complications, and only 4
nts weighed more than 1600 g. The mean gesta-
al age was 32 weeks and the range was 28 to 38
s. All infants presented with respiratory prob-
. Hyperbilirubinemia occurred in 7 infants.
infants had rapid respirations (greater than 60
0 breaths/min), periodic breathing, lethargy and
tability before the onset of abdominal symptoms.
e nonspecific symptoms also occurred in numerous
nts who had respiratory disease and who did not
equently have necrotizing enterocolitis. Symp-
suggesting abdominal disease appeared in 6 in-
s between the 3rd and 7th day of life. Abdominal
ension was observed in all infants as one of the
iest features. The radiographic features included
eased intraluminal gas and fluid; waxing and
ng bouts of bowel distension; a "bubbly" pattern
times localized to the right lower quadrant but
uently more extensive and reflecting the extent
he disease; hepatic portal venous gas; and seg-
al dilatation, narrowed segments, thickened folds,
an irregular mucosal pattern of the small bowel.
patients were treated surgically. The other,
had congenital heart disease, was treated medi-
y with bowel decompression, broad spectrum anti-
ic therapy, and respiratory assistance. Seven
nts died. In 9 of the 10 cases, the radiologist
t made the correct diagnosis. It is concluded
early diagnosis is critical to the institution
roper therapy in premature infants with necro-
ng enterocolitis. Plain abdominal radiographs
be taken of all premature infants with abdominal
ension, vomiting, apneic spells, jaundice, or
ac-positive stools. Barium contrast studies of
small bowel and colon are of no value in making
diagnosis, and can be misleading.

LOW MOLECULAR WEIGHT DEXTRAN IN THE TREAT-
MENT OF NECROTIZING ENTEROCOLITIS AND MIDGUT
ULUS IN INFANTS. *(E.)* Krasna, I. H.; Fox, H.
Schneider, K. M.; Becker, J. M. (Mt. Sinai Sch.
, City Univ. New York, N.Y.). *J. Pediatr. Surg.*
:615-622, 1973.

use of its abilities to reduce thrombus formation,
molecular-weight dextran (10 ml/kg every 6 hr for
r, i.v.) was administered to 8 newborns with ne-
izing enterocolitis and 2 infants with midgut
ulus. The enterocolitis group which received
ran was compared with an otherwise similarly
treated group which did not receive dextran; half of the dextran-treated group did not require operation while all of the patients not receiving dextran did. Although repeated perforation and late intestinal strictures occurred commonly in the group which did not receive dextran, no dextran-treated infant demonstrated either of these complications. The patients with midgut volvulus receiving dextran demonstrated remarkable recovery of bowel at reexploration, despite the widespread ischemic appearance of bowel at initial operation. No complications from the use of dextran were encountered.

4081 STIMULATION OF INTESTINAL ADENYL CYCLASE BY ENTEROTOXIN: COMPARISON OF STRAINS FROM AN INFANT AND AN ADULT WITH DIARRHEA. *(E.)* Kantor, H. S.; Tao, P.; Gorbach, S. L. (Cook County Hosp., Chicago, Ill.). *J. Infect. Dis.* 129(1): 1-9, 1974.

The effects of *Escherichia coli* enterotoxin on the activity of adenyl cyclase in intestinal mucosa were determined in the small intestine of the rabbit. *In vivo* incubation of enterotoxin in isolated intestinal loops for 2-4 hr increased the activity of adenyl cyclase in mucosal epithelial cells. The degree of stimulation of the enzyme was proportional to the concentration of enterotoxin. The levels of activity were additive when enterotoxin-treated, homogenized mucosal cells were exposed to prostaglandin E_1. The activity of adenyl cyclase in both enterotoxin-treated and control preparations was stimulated markedly by NaF. Phosphodiesterase activity was not altered in enterotoxin-treated loops. Enterotoxin was partially inactivated when held at 60 C for 15 min; it was completely inactivated at 100 C. Differences in the degree of stimulation of adenyl cyclase were noted among strains of *E. coli*. Enterotoxin from a strain isolated in an adult in Calcutta with cholera-like diarrhea was a more potent stimulator of adenyl cyclase than enterotoxin from a strain of *E. coli* associated with a mild case of diarrhea in an infant in Chicago. Such differences may have important implications for an understanding of the epidemiology of acute diarrhea.

4082 GASTROINTESTINAL COMPLICATIONS OF PHEOCHROMOCYTOMA. *(E.)* Hunter, T. B.; Martel, W. (Univ. Michigan Med. Ctr., Ann Arbor). *J. Can. Assoc. Radiol.* 24(4):374-376, 1973.

The available roentgenograms and medical records of 24 cases of pheochromocytoma were reviewed. The patients ranged in age from 9 to 63 yr; 7 were younger than 20, 10 were between 20 and 40, and 6 were over 40. Two patients had a family history of pheochromocytoma and 2 additional patients were brothers. Nausea and vomiting were prominent symptoms in 7 and 8 patients, resp., and were usually chronic or paroxysmal and associated with other symptoms. Five patients had chronic constipation; 1 patient, a 9-year-old boy, had multiple episodes of fecal impaction, 2 patients had chronic intermittent diarrhea. There were 3 patients in whom plain films of the abdomen demonstrated gaseous dilatation of both the small and large bowel with retained fluid. In 4 patients the adrenal tumor was evident on plain roentgenograms. Necropsy, performed in 3 of the 24 cases, showed marked generalized hypertrophy of the tunica muscularis of the intestinal arteries in 1 patient, focal areas of hemorrhagic necrosis throughout the large and small bowel in the 2nd, and no significant intestinal abnormalities in the 3rd. Of the 24 case histories, 10 had well-documented hypertension for longer than 3 yr, and as long as 15 yr before the tumor was discovered. It is concluded that pheochromocytoma should be considered in the differential diagnosis of patients with hypertension who develop abdominal pain, prolonged ileus, or intestinal bleeding.

4083 NECROTIZING ENTEROCOLITIS AND EXCHANGE TRANSFUSION.

(E.) Shapiro, M.; Stein, H. (South African Blood Transfusion Service, Johannesburg). *S. Afr. Med. J.* 47(28):1236-1238, 1973.

The primary role of intestinal infection on necrotizing enterocolitis is discussed. At one Johannesburg hospital, 63 babies in a prematurity unit had diarrhea. *Salmonella* was cultured from the stools of 22 of them. Eleven developed necrotizing enterocolitis and all of these died; 2 had received exchange transfusions for hyperbilirubinemia. At another hospital, there were 19 cases of necrotizing enterocolitis in infants; 4 died. No specific pathogen was isolated. Thirteen of these babies had received exchange transfusions for hyperbilirubinemia. In the 6 months embracing both outbreaks, 269 exchange transfusions were performed by the same transfusion team in other units of the 1st hospital, and 587 in other maternity hospitals, without a single case of necrotizing enterocolitis among the 596 recipients. Although these outbreaks of necrotizing enterocolitis were unquestionably due to intestinal infection *ab initio*, the possibility remains that the exchange transfusions aggravated the necrotizing lesion in some babies. It is therefore recommended that exchange transfusion be administered with caution, and preferably withheld, if the infant has diarrhea or blood in the stools, or if intestinal infection is known to be prevalent in the unit or hospital.

4084 CONTROLLED TRIAL OF ORALLY ADMINISTERED LACTOBACCILLI IN ACUTE INFANTILE DIARRHEA.

(E.) Pearce, J. L.; Hamilton, J. R. (Dept. Pediatr., Univ. Toronto, Canada). *J. Pediatr.* 84(2):261-262, 1974.

Ninety-four children under 3 yr of age who required hospital admission because of acute-onset diarrhea were administered placebos or oral preparations of lactobacilli over a period of 10 months. No significant difference was found between the placebo and treatment groups in the number and size of stools passed for 4 days after onset of treatment. The mean duration of diarrhea in the two groups also did not differ significantly. Furthermore, the lactobacilli had no apparent beneficial effect when either short-term or long-term cases were considered separately. Thus, the data do not support the hypothesis that lactobacillus might shorten the course of acute-onset diarrhea and reduce the incidence of relapse.

4085 HAEMANGIOMAS OF THE GASTRO-INTESTINAL TRACT.

(E.) Taylor, T. V.; Torrance, H. B. (Manchester Roy. Infirm., England). *Br. J. Surg.* 61(3):236-238, 1974.

Four cases of hemangiomatous malformations of the gastrointestinal tract are described. The first case involved an 11-yr-old girl; the lesion involved the entire stomach and a total gastrectomy was performed. In the second patient, a 25-yr-old man, diffuse hemangiomas and lymphangiomas were found throug out the entire small intestine. The third patient, a 34-yr-old man, presented with a history of anemia and a primary symptom of dyspnea. Although there was no history of alimentary symptoms, laparotomy revealed numerous large hemangiomatous malformations throughout the entire intestinal tract; laparotomy also confirmed complete absence of a spleen. Laparotomy of a 38-yr-old man revealed a diffuse cavernous hemangioma which involved the whole rectum, the lower half of the sigmoid colon, and the bladder. The spleen was probably also hemangiomatous and there were numerous ascites in the abdominal cavity. Treatment involved ligation and division of both of the feeding vessels. Postoperatively, the patient developed gross ascites, but when this settled he remained asymptomatic. In general, hemangioma should be suspected when a patient presents with recurrent attacks of anemia or melena for which no other cause can be found after contrast radiography. Where possible, resection of the involved length of gut is curative. Other methods which have been employed in isolated cases are cauterization, partia extirpation, irradiation by deep X-ray therapy or implanted radon seeds, and the injection of sclerosing substances.

4086 ENDOSCOPY IN THE PEUTZ-JEGHERS SYNDROME.

(E.) Kurtz, R. C.; Winawer, S. J.; Sherlock, P. (Mem. Sloan-Kettering Cancer Ctr., New York, N.Y.). *Am. J. Gastroenterol.* 61(2):125-128, 1974.

The natural history of the Peutz-Jeghers syndrome is discussed with reference to the case of a 26-yr-old man. The patient was first hospitalized for severe, crampy abdominal pains and iron deficiency anemia. Laparotomy at that time and during subsequent hospitalization revealed several small bowel polyps. Later, upper gastrointestinal series, small bowel series, and barium enema demonstrated numerous gastric, duodenal, small intestinal, and large bowel polyps. Two large pedunculated polyps were also found at the cardioesophageal junction. The gastric and duodenal polyps were visualized with the fiberoptic gastroduodenoscope. The visual findings at endoscopy suggested bleeding from one large duodenal polyp, which later proved to be a benign hamartoma. Although Peutz-Jeghers polyps such as this one are generally benign hamartomas, there is evidence of a higher risk of malignancy in the gastroduodenal area of affected patients. As illustrated in this case, endoscopy is a valuable asset to the

troenterologist in the management of this syn-
me in that it aids in the localization of bleed-
and in the evaluation of the presence or absence
malignancy.

7 OCCURRENCE OF HUMAN YERSINIOSIS (Yersinia
enterocolitica) INFECTION IN BUDAPEST.
.) Nyomarkay, I.; Kubinyi, J.; Mihalyfi, I.;
ta, J. (Budapest Munic. Inst. Public Health Epi-
iol., Hungary). *Budapest. Kozegeszsegugy* 3:68-
1973.

3 TREATMENT OF PSYCHOSOMATIC GASTROINTESTINAL
DISORDERS IN OUTPATIENTS. *(It.)* De Mar-
o, G.; Giorgi-Conciato, M.; Gaudieri, V.; Caruso,
De Iorio, A. (Reg. Gen. Hosp. Agency, Naples,
ly). *Minerva Med.* 64(87):4583-5895, 1973.

9 EPIDEMIC OF CHOLERA EL TOR IN NAPLES, 1973.
(E.) De Lorenzo, F.; Soscia, M.; Manzillo,
Balestrieri, G. G. (D. Cotugno Hosp. Infectious
., Naples, Italy). *Lancet* (7859):669, 1974.

0 ZOLLINGER-ELLISON SYNDROME WITH DIABETES
MELLITUS. *(Ger.)* Regényi, J. (Med. Univ.,
ged, Hungary). *Z. Inn. Med.* 29(3):124-127, 1974.

1 SOME DIAGNOSTIC PROBLEMS IN DIARRHOEAL
ILLNESS. *(E.)* Sladen, G. E. (Roy.
., Sheffield, England). *Br. J. Hosp. Med.*
):253-262, 1974.

2 RECENT TRENDS IN HUMAN SALMONELLOSIS IN
ENGLAND AND WALES: THE EPIDEMIOLOGY OF
VALENT SEROTYPES OTHER THAN SALMONELLA TYPHI-
IUM. *(E.)* Lee, J. A. (Central Public Health
., London, England). *J. Hyg. (Camb.)* 72(2):
-196, 1974.

3 USE OF ANTIPERISTALTIC SEGMENTS OF IN-
TESTINAL LOOPS IN EXTENSIVE ENTERECTOMIES:
ERIMENTAL STUDY IN DOGS. *(Por.)* de Tolosa, E. M.
(Fac. Med., Univ. Sao Paulo, Brazil). *Rev.*
. Clin. Fac. Med. Sao Paulo 28(5):255-266, 1973.

4 CANCER OF THE GASTROINTESTINAL TRACT IN
COSTA RICA. *(Sp.)* Moya de Madrigal, L.
t. Med. Statistics, Min. Public Health, San Jose,
ta Rica). *Bol. Of. Sanit. Panam.* 76(4):300-313,
4.

5 GASTROINTESTINAL BLEEDING IN PATIENTS UNDER-
GOING ANTICOAGULANT THERAPY. *(Fr.)* La-
le, J. M.; Bodin, F.; Lichtenstein, H.; Conte, M.
. Antoine Hosp., Paris, France). *Sem. Hop. Paris*
14):941-945, 1974.

6 HUMAN SALMONELLOSIS IN THE PROVINCE OF
QUEBEC (1967-1972). *(Fr.)* Achong Low,
K.; Kasatiya, S. S.; White, F. M. M.; Kasatiya, E.; Petrow, S. (McGill Univ., Montreal, Canada). *Can. J. Public Health* 65(2):94-105, 1974.

4097 THE ETIOLOGY, CLINICAL FEATURES, AND TREATMENT OF SIALADENITIS AND SIALOLITHIASIS OF THE SUBMANDIBULAR AND SUBLINGUAL GLANDS. *(Ger.)* Thieme, V.; Berthold, H. (Clin. Polyclin. Stomatol., Friedrich Schiller Univ., Jena, Germany). *Wissenschaftl. Z. Friedrich Schiller Univ. Jena (Math. Nat.)* 23(1):55-61, 1974.

4098 A CONTROLLED FIELD TRIAL OF THE EFFECTIVENESS OF MONOVALENT CLASSICAL AND EL TOR CHOLERA VACCINES IN THE PHILIPPINES. *(E.)* Azurin, J. C.; Cruz, A.; Sumpaico, J.; Dizon, J. (Philippines Cholera Committee, Manila). *Bull. W.H.O.* 49(1):13-19, 1973.

4099 MICROSPECTROPHOTOMETRIC DNA ANALYSIS OF MALIGNANT SALIVARY GLAND TUMORS. *(E.)* Eneroth, C.-M.; Zetterberg, A. (Karolinska Inst., Stockholm, Sweden). *Acta Otolaryngol. (Stockh)* 77(4):289-294, 1974.

4100 ENTERITIS NECROTICANS IN AGOGO, SOUTHERN GHANA. *(E.)* Van Enk, A.; Van Der Esch, E. P. (Presbyterian Church Hosp., Agogo, Ghana). *Trop. Geogr. Med.* 25(4):313-324, 1973.

4101 SERO-SURVEY OF SALMONELLA INFECTION IN MAN AND ANIMALS BY INDIRECT HAEMAGGLUTINATION TEST. *(Ger.)* Singh, I. P.; Kaura, Y. K.; Sharma, V. K. (Coll. Vet. Sci., Haryana Agr. Univ., Hissar, India). *Zentralbl. Bakteriol [Orig. A]* 226(1):55-62, 1974.

4102 USE OF AN ELEMENTAL DIET FOR INTESTINAL DISORDERS AND FOR THE CRITICALLY ILL. *(E.)* Bounous, G.; Devroede, G.; Haddad, H.; Beaudry, R.; Perey, B. J.; Lejeune, L. P. (Fac. Med., Univ. Sherbrooke, Canada). *Dis. Colon Rectum* 17(2):157-165, 1974.

4103 SCLERODERMA OF THE GASTROINTESTINAL TRACT. *(E.)* Berk, R. N. (Univ. California San Diego, Sch. Med., La Jolla). *Am. J. Gastroenterol.* 61(3):226-231, 1974.

4104 OUTPATIENT SCREENING FOR GASTROINTESTINAL LESIONS USING GUAIAC-IMPREGNATED SLIDES. *(E.)* Glober, G. A.; Peskoe, S. M. (Natl. Cancer Inst., NIH, Honolulu, Hawaii). *Am. J. Dig. Dis.* 19(5):399-403, 1974.

See also, 3375, 3629, 3635, 3668, 3742.

4105 THE LIVER IN AMOEBIC DISEASE. A REPORT ON CLINICAL AND SCINTIGRAPHIC OBSERVATIONS IN 247 PATIENTS. *(E.)* Bieler, E. U.; Meyer, B. J.; Jansen, C. R.; Du Toit, D. (Life Sci. Div., Atomic Energy Board, Pretoria, South Africa). *S. Afr. Med. J.* 48(8):308-320, 1974.

A group of 247 patients (202 males and 45 females, aged 2 1/2 to 80 yr) with amebic liver abscesses was examined by scintigraphy. Pain in the right upper abdomen or right shoulder for 3-9 weeks was present in all patients. Severe weight loss occurred in 21%, diarrhea in 28%. Hepatomegaly or a tumor was clinically evident in 87%. Vegetative amebae were found in 17%. Clinical diagnosis was liver abscess in 96%. Gastrointestinal complications included amebic peritonitis (1), amebic pericarditis (2), a fistula through the abdominal wall after drainage (2), and obstructive jaundice (1). The combination of right lateral and anterior views was sufficient to allow diagnosis in 99% of the cases. On dividing the liver into 7 regions, abscesses were restricted to one region in 126 patients while 19 had abscesses large enough to replace the whole right lobe. The most commonly affected region was the posterior upper part of the right lobe, 34%. Hospitalization was significantly longer in patients with lesions in the superior part of the right lobe than in those with lesions in the inferior part or the central parts of the liver. A relation was established between the presence of hyperbilirubinemia and the localization of the abscess. Of 13 patients with serum bilirubin above 1.3 mg/100 ml, 8 had abscesses arising in the porta hepatis, 3 had multiple lesions, of which 2 had visible portal manifestations. The remaining 2 patients had large abscesses involving the whole right lobe of the liver. In 41.5% of the cases with portal abscesses, hyperbilirubinemia was present. Thus the retention of bilirubin in hepatic amebic disease probably arises more often from mechanical factors than from insufficiency of the liver parenchyma. No significant correlation could be drawn between length of history and size of abscess. The size of the abscess apparently has no bearing on the outcome of the disease, for the abscess rarely interferes seriously with the function of the liver parenchyma. Neither the initial size of the lesion nor the type of treatment determined whether the liver would heal without severe deformation. The rate of healing of the abscess was closely related to its size in that healing is fastest at the beginning of therapy. Although the scintigraphic appearance of the liver parenchyma adjacent to the abscess was normal in most cases, a marked uneven uptake occurred in 7 patients due to reduced hepatic blood flow, disturbed function of the hepatic parenchyma, or fibrosis of the liver. An enlarged liver, clinically diagnosed in 87% of the cases, was demonstrated scintigraphically in only 69%. It is suggested that liver function tests may help differentiate amebic abscess from common conditions showing similar symptomatology.

4106 AIR AS A NEGATIVE CONTRAST MEDIUM IN THE STUDY OF AMEBIC LIVER ABSCESS. *(E.)* Ramachander Rao, S.; Murthy, K. J. R.; Chandramouli, C. (Osmania Med. Coll., Hyderabad, India). *Am. J. Gastroenterol.* 60(5):504-509, 1973.

The usefulness of atmospheric air in the delineation and follow-up of amebic abscess of the liver was studied in 20 patients. Each patient received tetracycline, chloroquine phosphate, and hydroxyquinoline. On the second day of treatment aspiration was made with a thick bore aspiration needle and 50-100 cc atmospheric air was then injected till a slight positive pressure was felt. Subsequent aspirations were made every 5th day for 5 times and then every 10th day until no pus could be further aspirated. X-rays were taken until no air was detected in the abscess cavity and progress was assessed by reduction in cavity size by screening. Air when instilled into the cavity, delineates it uniformly unlike radiopaque dyes which settle at the bottom. Multiple cavities may be visualized by this means as the air gains access to them. Studies usin air do not have the drawbacks of false positives or false negatives. It is further noted that, since the air does not remain for a long time, there is no chance of granuloma formation. None of these 20 cases had infection or air embolism. Lesions as small as 5 mm diameter have been visualized in the follow-up studies.

4107 AMOEBIC PERFORATION OF THE INTESTINE IN CHILDREN. *(E.)* Cade, D.; Webster, G. D. (Westminster Hosp., London, England). *Br. J. Surg.* 61(2):159-161, 1974.

Perforation of the intestine due to *Entamoeba histolytica* occurred in 3 patients (2 boys and 1 girl, aged 9 months to 3 yr). Presenting symptoms varied widely among the patients. The history of their illnesses ranged from 4 days to 3 weeks with all having or developing bloody diarrhea with mucus and vomiting. In all cases distension of the abdomen was present, but rigidity occurred in only 1. Bowel sounds were present until a late stage. Temperature rose in 2 cases. In 2 cases coughs were present. The misdiagnoses in these cases included *Salmonella* infection, appendicitis, intussusception, typhoid, and gastroenteritis, all of which delayed proper treatment. A fuller understanding of the fulminating nature of amebic infection in young infants and children is necessary if early diagnosis is to be made and effective treatment started. In 1 of these cases examination showed marked chest signs and it i stressed that such a finding must confirm amebiasis rather than *Salmonella* infection as a diagnosis. X-ray of 1 case revealed air under the diaphragm and in another case the colon was dilated with fluid levels at both bases of the loop. Failure to find the *E. histolytica trophozoites* in a single specimen does not exclude the disease, for they are passed only at intervals. For amebiasis of moderate severity, surgery is recommended. Conservative trea ment gives the best results in peritonitis complicating the acute fulminating type of amebic dysentery. Many complications can follow surgical procedures used in such cases. In this series perfora-

s in the transverse colon followed 2 days after
ndectomy in one case.

SIGMOIDOSCOPIC AND COLONIC MUCOSAL BIOPSY
FINDINGS IN AMEBIC COLITIS. *(E.)* Pitt-
F. E.; Hennigar, G. R. (Med. Univ. South Caro-
, Charleston). *Arch. Pathol.* 97(3):1551-1558,
.

oid colonic mucosal biopsy specimens from 9 pa-
ts with well-documented acute amebic colitis
studied. A diffuse nonspecific inflammatory
onse was characteristic of all biopsy specimens
her or not focal ulceration and trophozoites of
moeba histolytica were shown to be present.
ae were found in only 50% of pretreatment biopsy
imens in spite of extensive serial sectioning.
appearance of the mucosa at sigmoidoscopy in
group of patients was compatible with sigmoido-
ic findings in nonspecific (ulcerative) or granu-
tous colitis. It is noted that, in the absence
he amebae, the histologic characteristics of
ic colitis may be indistinguishable from other
s of colitis. Thus it is necessary to consider
ic colitis in a differential diagnosis whenever
nic mucosal biopsy specimens containing nonspeci-
inflammation are seen.

EPIDEMIOLOGICAL EVALUATION OF THE EFFI-
CIENCY OF ORAL VACCINATION AGAINST ENTERO-
OGENIC Escherichia coli. *(E.)* Kubinyi, L.;
, I.; Lendvai, K. G. (Natl. Inst. Pub. Health,
pest, Hungary). *Acta Microbiol. Acad. Sci.*
. 19(3):175-186, 1972.

rimental vaccination of hospitalized infants was
ormed with the Rauss-type trivalent oral vaccine
nst enteropathogenic *Escherichia coli* infection.
he periods 1969-70 and 1970-71, each infant
ived for basic immunization 9 and 18 tablets,
. The maintenance dose was 1 tablet weekly
ughout the period of hospitalization. The vac-
contained 0.5 mg each of freeze-dried Boivin-
extracts of *E. coli* O111:B4, *E. coli* O55:B5
E. coli O86:B7 per tablet. It dissolved readily
ea and had no noticeable side effect. A total
27 vaccines and 1040 unvaccinated controls were
rved during the experimental period. Infantile
ritis associated with *E. coli* occurred in 28
inated infants (incidence, 4.5%) and in 79 control in-
duals (incidence, 7.6%). The protective effect of
vaccine increased parallel with the age of the
inated infants, the rate of protection being 30% among
born mature and premature babies, 55% among
month-old and 74% among 3-month-old infants.
mean protective effect was 40.8%. Vaccination
no influence on the clinical course of the di-
e, nor on the incidence of symptomless excretion.
g the unvaccinated controls, the incidence of in-
ion increased parallel with the duration of
italization. The protective effect of vaccination
however, demonstrable only during the first 2
hs (65%) of hospitalization. It is suggested
the basic immunization be repeated or performed
vo with a high enough dose to render repetition
cessary if the infant is to remain hospitalized
more than 3 months. In most cases the etiological agent was *E. coli* O111:B4. The symptomless excretors excreted several other *E. coli* sero-groups as well. On the basis of the epidemiological evaluation, the vaccine appears to be a useful preventive measure against nosocomial epidemics. Since, however, delayed cases also occur, the present dosage schedule needs revision.

4110 GIARDIASIS IN CHILDREN: A STUDY OF PANCREATIC FUNCTIONS. *(E.)* Gupta, R. K.; Mehta, S. (Postgrad. Inst. Med. Ed. Res., Chandigarh, India). *Indian J. Med. Res.* 61(5):743-748, 1973.

Of 1,551 children screened, 11.1% had cysts of *Giardia intestinalis* in the stools. Diarrhea, abdominal discomfort and failure to thrive were the significant symptoms. Pancreatic function, stool fat and nitrogen excretion were studied in 25 of the children with symptomatic giardiasis and in 16 normal controls. Steatorrhea was present in 10 of the 25 giardia cases, and fecal fat excretion decreased significantly in all giardia cases following eradication of the parasite. Pancreatic lipase and trypsin activities were lower in the giardia group compared to the controls. Pancreozymin stimulation, used in 10 giardia subjects and in 6 normal controls, increased the activity of both enzymes, but the level of activity in the giardia subjects continued lower than in the controls. Stool fat excretion revealed a significant correlation with stimulating lipase activity. Such a relation was not observed between stool nitrogen and trypsin. From these results it is suggested that the parasite interferes with the action of pancreatic lipase, resulting in increased stool fat excretion. It is also suggested that an interference in the action of bile salts may occur.

4111 SCHISTOSOMAL COLONIC POLYPOSIS: ENDOSCOPIC AND HISTOLOGIC CHARACTERISTICS. *(E.)* Nebel, O. T.; El-Masry, N. A.; Castell, D. O.; Farid, Z.; Fornes, M. F.; Sparks, H. A. (Naval Hosp., San Diego, Calif.). *Gastrointest. Endosc.* 20(3):99-101, 1974.

Ten Egyptian farmers (mean age, 34 yr; range, 16 to 40 yr) with active schistosomal colonic polyposis were evaluated. The Bells egg count technique was used to estimate the intensity of *Schistosoma mansoni* infection and the MIFC technique to detect the eggs in the stools. Barium enema was employed to screen patients for presence and extent of polyps. Sigmoidoscopy and colonoscopy also were performed. Endoscopic biopsies and crush preparation were obtained for histological study. Diarrhea, hematochezia, and a long history of schistosomiasis were present in all patients. Six patients had hepatomegaly, and 5 patients had splenomegaly. Laboratory studies revealed the presence of anemia, hypoalbuminemia, and elevated alkaline phosphatase activity. Viable schistosome eggs were seen in the stools of all patients. Barium enema revealed multiple colonic polyposis in all patients. Polyps were noted from the rectum to transverse colon with the greatest concentration of polyps being found in the sigmoid colon. The polyps ranged from small mucosal excrescences to large fungating lesions. Polyps greater than 1 cm were generally covered by a white exudate, and both polyp and colonic mucosa were friable. Three patients had polyps associated with necrotic lesions. The endoscopic appearance of the schistosomal polyps and the immediate examination of the endoscopic biopsy specimen allow rapid differentiation of schistosomal colonic polyposis from other forms of colonic polyposis. The importance of this differentiation to both therapy and prognosis suggest that endoscopic observation and biopsy should be performed in all patients with suspected colonic schistosomiasis.

4112 BILHARZIAL PIPE-STEM PORTAL FIBROSIS IN ZAMBIA. *(E.)* Bhagwandeen, S. B. (Sch. Med., Univ. Zambia, Lusaka). *J. Pathol.* 111(1): 23-30, 1973.

Ten case histories of pipe-stem portal fibrosis from Zambia are presented to illustrate the clinical and necropsy findings. Hematemesis was evident in 4 cases, vomiting in 2, and cerebral malaria in 2. Cardiac failure, severe anemia, and severe ascites were each evident in 1 case. Seven of the 10 cases showed classical macroscopic features of Symmers' pipe-stem portal fibrosis. The gross liver showed pseudolobulation on the capsular surface. The capsule in all cases was smooth. Macroscopically the cut surface showed the typical dense white bands of scar tissue surrounding the portal veins. Histological examination of areas around the portal tracts showed dense fibrous scar tissue. Within these areas were a variable number of recognizable bilharzial ova and, more frequently, fragments of their chitinous covering. Angiomatoid lesions were noted in all sections with established pipe-stem fibrosis examined. Acute and healing granulomatous lesions surrounding bilharzial ova were occasionally noted within the scar tissue around the portal tracts, as well as in the finer portal radicles of the apparently healthy zones. There appear to be three stages of hepatic bilharziasis: miliary hepatic bilharziasis with acute pseudotubercles in portal tracts; intermediate proliferative stage corresponding to fibroblastic proliferation and repair around the granulomatous lesions; and late fibrotic stage characterized by fibrosis of the finer and intermediate sized portal radicles with distortion of the portal tracts.

4113 THE ACTION OF ETOFAMIDE IN CHRONIC INTESTINAL AMEBIASIS AND ITS INNOCUITY TO THE LIVER CELL. *(Por.)* Otero, N. B.; Pereira, L. M. C. M.; Silva, N. T. da; Mendonca, D. V.; Gueiros, Z. M.; Leitao, E. G. (Bio-Med. Ctr., Fed. Univ., Para, Brazil). *Rev. Bras. Clin. Terap.* 2(11): 581-586, 1973.

4114 DIGESTIVE HEMORRHAGE IN SCHISTOSOMOTIC PATIENTS WITH ESOPHAGEAL VARICES AND HIATAL HERNIA. *(Por.)* Cordeiro, F. T. M. (Fac. Med., Fed. Univ. Pernambuco, Recife, Brazil). *Arq. Gastroenterol. S. Paulo* 11(1):11-15, 1974.

4115 HEPATO SPLENIC DISEASE CAUSED BY Bilharzi
haematobium IN UPPER EGYPT. *(E.)* Nooman
Z. M.; Nafeh, M. A.; El-Kateb, H.; Atta, S. M.;
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4116 COMPONENTS OF GLUCOSE TRANSPORT IN THE HOST-PARASITE SYSTEM, Hymenolepis diminuta (CESTODA) AND THE RAT INTESTINE. *(E.)* Podesta, R. B.; Mettrick, D. F. (Dept. Zoology,
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4117 DIAGNOSIS AND THERAPY OF ECHINOCOCCAL CYSTS. *(E.)* Kurock, W.; Schniepp, K.;
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4118 RIGHT ILEOCOLITIS SECONDARY TO ANISAKIASI
(E.) Richman, R. H.; Lewicki, A. M. (Harvard Med. Sch., Boston, Mass.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 119(2):329-331, 1973

4119 AN EPIDEMIOLOGICAL INVESTIGATION INTO Schistosoma mansoni TRANSMISSION IN MWANZA, TANZANIA. *(E.)* McCullough, F. S.; Magendantz, M. (East African Inst. Med. Res., Mwanza, Tanzania). *Ann. Trop. Med. Parasitol.* 68(1):69-80, 1974.

4120 CHRONIC INTESTINAL COCCIDIOSIS IN MAN: I
TESTINAL MORPHOLOGY AND RESPONSE TO TREAT
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Gastroenterology 66(5):923-935, 1974.

4121 EFFECT OF SCHISTOSOMAL INFECTION AND OF
SCHISTOSOMICIDAL DRUGS ON THE DRUG METABO
LIZING ENZYMES OF MOUSE LIVER. *(E.)* Ghazal, A.;
Mahfouz, M.; Makar, A. B.; Ghoneim, M. T. (Fac. Med
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4122 A COMPARATIVE STUDY OF THE IN VITRO ACTIVITIES OF NIFURATEL AND OF OTHER DRUGS ON
A PATHOGENIC BRAZILIAN STRAIN OF Entamoeba histolytica. *(Por.)* Campos, R. (Inst. Biomed. Sci., Univ. Sao Paulo, Brazil). *Rev. Bras. Clin. Terap.* 2(11):587-588, 1973.

4123 A RARE COMBINATION OF DISEASES CAUSED BY
ASCARIASIS. *(Rus.)* Kulik, I. I.; Trostian, A. N. (Poltava Reg. Hosp., USSR). *Vrach.*
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4 ASCARIASIS: A FAMILY DISEASE. *(E.)* Wil-
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GENERAL

Regional Enteritis

THE TREATMENT OF ILEOCOLITIS WITH ACTH
AND PREDNISONE: IMMEDIATE AND PROLONGED
CT. *(E.)* Barham, J. E.; Ruffin, J. M. (Cross-
Clin., Durham, N.C.). *South. Med. J.* 67(4):
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hundred consecutive patients with ileocolitis
treated with ACTH i.v. followed by oral predni-
. Each patient received 40 U/liter ACTH as a
tinuous i.v. drip for 20 hr/day for 5-7 days,
nding on response. After the initial treatment,
l was tapered by reducing the time rather than the
for 3 days. Prednisone dosage was 10 mg three
s daily for 1 week, 10 mg twice daily for 1
, 5 mg twice daily for 1 week, and 5 mg daily
1 week. Following the initial course of treat-
, 95 patients were either symptom-free or mark-
improved. Of 90 who had subsequent courses of
apy, 80 were immediately either symptom-free or
edly improved, indicating that tolerance was
developed. In 89 patients observed for 6 months
onger, 23 were either symptom-free or had no
rrences requiring hospitalization; 66 had re-
ences requiring hospitalization for medical man-
ent or operation. Mean duration of remission
25 months (range, up to 11.5 yr). There were
ignificant differences in long-term results be-
n steroid therapy and operation. Complications
side effects were minimal or absent. Although
her the natural history of the disease nor the
l for operation is altered, the excellent immediate
ct with long periods of remission between recur-
es suggests that ACTH given i.v. followed by
oids given orally is the medical treatment of
ce for ileocolitis.

5 EPIDEMIOLOGY OF REGIONAL ENTEROCOLITIS
(CROHN'S DISEASE) AND ULCERATIVE COLITIS.
Myren, J. (Ulleval Hosp., Oslo, Norway). *J.*
m. *Surg.* 16(4):96-99, 1974.

4127 CROHN'S DISEASE, ULCERATIVE COLITIS, AND PSYCHOLOGY. *(E.)* Lourens, P. J. D. (Dept. Med., Univ. Alabama, Birmingham). *Ala. J. Med. Sci.* 10(3):285-293, 1974.

4128 ULCERATIVE COLITIS AND GRANULOMATOUS COLITIS: PATHOLOGICAL AND CLINICAL EFFECTS. *(It.)* Masera, N. (Dept. Surg. Anat., Univ. Ancona, Italy). *Minerva Med.* 65(11):605-609, 1974.

4129 ONE CASE OF REGIONAL ENTERITIS. *(It.)* Mandelli Contegni, G. (Circolo Hosp., Varese, Italy). *Minerva Med.* 65(11):614-619, 1974.

4130 SURGICAL MANAGEMENT OF REGIONAL ILEITIS, ULCERATIVE COLITIS, AND GRANULOMATOUS COLITIS. *(E.)* Wheelock, Jr., F. C. (Massachusetts Gen. Hosp., Boston). *Surg. Clin. North Am.* 54(3): 675-688, 1974.

4131 SYSTEMIC GRANULOMATOUS REACTION TO SALICYLAZOSULFAPYRIDINE (AZULFIDINE) IN A PATIENT WITH CROHN'S DISEASE. *(E.)* Rafoth, R. J. (Hennipen County Gen. Hosp., Minneapolis, Minn.). *Am. J. Dig. Dis.* 19(5):465-469, 1974.

4132 CROHN'S DISEASE IN TRANSVAAL BLACKS. A REPORT OF THREE CASES WITH A REVIEW. *(E.)* Davis, R.; Schmaman, A.; Cosman, B. (Baragwanath Hosp., Johannesburg, South Africa). *S. Afr. Med. J.* 48 (14):580-587, 1974.

See also, 3626, 3821, 3910, 3913, 3918.

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GASTROENTEROLOGY

ABSTRACTS
AND
CITATIONS

8

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NATIONAL INSTITUTE OF ARTHRITIS, METABOLISM, AND DIGESTIVE DISEASES

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *World Medical Periodicals*, 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans
Ar.	Arabic
Bul.	Bulgarian
Ch.	Chinese
Cz.	Czech
Dan.	Danish
Dut.	Dutch
E.	English
Eston.	Estonian
Fin.	Finnish
Fl.	Flemish
Fr.	French
Ger.	German
Gr.	Greek
Heb.	Hebrew
Hun.	Hungarian
Ic.	Icelandic
In.	Indonesian
It.	Italian
Jap.	Japanese
Kor.	Korean
Latv.	Latvian
Lith.	Lithuanian
Nor.	Norwegian
Pol.	Polish
Por.	Portuguese
Rum.	Rumanian
Rus.	Russian
Ser.	Serbo-Croatian
Sl.	Slovak
Sp.	Spanish
Sw.	Swedish
Th.	Thai
Turk.	Turkish
Uk.	Ukrainian
Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
ATP	adenosine triphosphate
BSP	sulfobromophthalein
C	degrees centigrade
cm	centimeter(s)
CNS	central nervous system
cpm	counts per minute
DNA	deoxyribonucleic acid
e.g.	for example
g	gram(s)
μg	microgram(s)
hr	hour(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kg	kilogram(s)
LD$_{50}$	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar
mEq	milliequivalent(s)
mM	millimolar
μM	micromolar
mC,μC	milli-,microcurie(s)
mg	milligram(s)
min	minute(s)
ml	milliliter(s)
mm	millimeter(s)
MTD	maximum tolerated dose
ng	nanogram (10^{-9})
pg	picogram (10^{-12})
p.o.	orally
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
Rev.	review (only in citations)
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

4133 A HISTOLOGICAL AND FUNCTIONAL STUDY OF THE GASTRIC MUCOSAL INNERVATION IN THE DOG. PART I: THE QUANTIFICATION OF THE FIBRE CONTENT OF THE NORMAL SUPRADIAPHRAGMATIC VAGAL TRUNKS AND THEIR ABDOMINAL BRANCHES. *(E.)* Kemp, D. R. (no affil.). *Aust. N.Z. J. Surg.* 43(3):288-294, 1973.

The supradiaphragmatic vagus and its abdominal branches were subjected to fiber counts in normal dogs and in dogs that had undergone proximal vagal sections resulting in fiber degeneration. In normal dogs, both vagal trunks, just before entering the abdomen, are composed of approximately equal numbers of fibers. The mean fiber count for the ventral trunk was 12,500 and for the dorsal trunk 13,233. Overall, it appears that 50% of the vagal fibers entering the abdomen, both efferent and afferent, are destined to supply the acid-bearing portion of the stomach. After extracranial supranodose unilateral vagotomy, the mean total fiber count in the abdominal vagal trunks was 24,655. This figure is slightly less than that obtained for the intact trunks (26,000 fibers) and represents a 50% loss of efferent fibers from the total vagal complement. The mean total fiber content of the abdominal trunks after unilateral infranodose vagotomy was 13,083 fibers. A mean total of 2250 fibers remained following bilateral vagotomy. The results suggest that there is no gross alteration in the functional distribution of fibers as branching occurs.

4134 SCANNING ELECTRON MICROSCOPY OF EXTRAHEPATIC BILIARY OBSTRUCTION. *(E.)* Compagno, J.; Grisham, J. W. (Washington Univ. Sch. Med., St. Louis, Mo.). *Arch. Pathol.* 97(6):348-351, 1974.

Scanning electron microscopy was used to evaluate the surface structure of rat liver parenchyma, both in normal rats and for 1 to 7 days after ligation of the common bile duct. After *in situ* fixation with 2.5% phosphate-buffered glutaraldehyde, examination by scanning electron microscopy showed flattening, progressive dilatation, and formation of sacculations and smooth-walled diverticula in bile canaliculi that were not seen in the normal liver. The canaliculi developed tortuosities, dilations, and angulations with prolonged obstruction. These changes usually occurred within 72-96 hr after duct ligation and did not progress significantly after day 4. Other than shearing artifacts caused by digital fracturing and seen at portal tracts and at the edges of endothelial cells, no evidence of artifacts caused by surface tension or evaporative forces was observed in these preparations. These results suggest that scanning electron microscopy is a useful adjunct for the study of normal and pathologic surface anatomy.

4135 ULTRASTRUCTURAL CHANGES IN THE LIVER OF BABOONS FOLLOWING LEAD AND ENDOTOXIN ADMINISTRATION. *(E.)* Hoffmann, E. O.; Di Luzio, N. R.; Holper, K.; Brettschneider, L.; Coover, J. (Louisiana State Univ. Med. Ctr., New Orleans). *Lab. Invest.* 30(3):311-319, 1974.

Adult baboons (*Papio papio*) received i.v. injections of either lead acetate (25 mg/kg) or *Escherichia coli* endotoxin (0.07 mg/kg), or both substances combined. The administration of lead or endotoxin alone did not result in any deaths, but simultaneous injection of both substances resulted in a 100% mortality rate. Ultrastructural changes in the group which received lead were characterized by vacuolization of some Kupffer cells and the presence of finely granular, electron-dense material. A very small number of parenchymal cells displayed degenerative changes. The endotoxin group had few fibrin deposits in the sinusoids and degenerative changes in a small proportion of both Kupffer and parenchymal cells. The morphologic changes produced by the combination of lead and endotoxin were marked and consisted of large deposits of fibrin and the presence of cellular debris and inflammatory cells in the sinusoids. Vacuolization and autophagocytosis of Kupffer and parenchymal cells, as well as necrosis and formation of large multivesicular bodies and fat droplets, occurred in parenchymal cells. The space of Disse was frequently obliterated by protein deposits. A finely granular, electron-dense material was also observed within the liver cells and sinusoids. Incipient lead inclusion bodies were present in the nucleus of Kupffer and parenchymal cells. Further experiments will be required to determine whether lead and endotoxin have a similar synergistic effect in man.

4136 ACTION OF PHENOBARBITAL ON THE ULTRASTRUCTURE AND THE ENZYMATIC ACTIVITY OF THE MOUSE INTESTINE AND THE MOUSE LIVER. *(E.)* Menard, D.; Berteloot, A.; Hugon, J. S. (Med. Ctr., Univ. Sherbrooke, Canada). *Histochemistry* 38(3):241-252, 1974.

The fine structure and the cytochemical activity of the liver, duodenum, and jejunum of 5-month-old Swiss ICR male mice were studied after phenobarbital treatment (100 mg/kg i.p. for 1-7 days). Proliferation of the smooth endoplasmic reticulum was observed in the centrilobular hepatocytes after 3 injections of phenobarbital and in the apical cells of the intestinal villi after 1 injection. In the liver, glucose-6-phosphatase activity remained localized in all the cisternae of the endoplasmic reticulum and in the nuclear envelope. Specific activities of glucose-6-phosphatase reached minimal values in the liver after 3 injections and in the duodenum and jejunum after 1 injection. Thereafter, values increased to normal levels in the liver and duodenum, despite daily injections of phenobarbital. In the jejunum, however, specific activities remained low. In contrast, alkaline phosphatase activities remained unchanged in the duodenum but increased in the jejunum. However, activities in the jejunum remained lower than those in the duodenum.

4137 STEREOLOGICAL ANALYSIS OF THE GUINEA PIG PANCREAS. I. ANALYTICAL MODEL AND QUANTITATIVE DESCRIPTION OF NONSTIMULATED PANCREATIC EXOCRINE CELLS. *(E.)* Bolender, R. P. (Dept. Anat., Univ. Berne, Switzerland). *J. Cell Biol.* 61(2): 269-287, 1974.

A stereological model which provides detailed quantitative information on the structure of the fasted, nonstimulated gland has been developed for the guinea pig pancreas. The model consists of morphologically defined space and membrane compartments which were used to describe the general composition of the tissue and the specific components of exocrine cells. The results are presented, where appropriate, relative to 1 cm^3 of pancreas, 1 cm^3 of exocrine cell cytoplasm, and to the volume of an average exocrine cell. The exocrine cells, accounting for 82% of the pancreas volume, consisted of 54% cytoplasmic matrix, 22% rough-surfaced endoplasmic reticulum, 8.3% nuclei, 8.1% mitochondria, 6.4% zymogen granules, and 0.7% condensing vacuoles. Their total membrane surface area was distributed as follows: 60% rough-surfaced endoplasmic reticulum, 21% mitochondria, 9.9% Golgi apparatus, 4.8% plasma membranes, 2.6% zymogen granules, 1.8% plasma membrane vesicles, and 0.4% condensing vacuoles.

4138 COMPARATIVE MORPHOLOGICAL AND HISTOAUTORADIOGRAPHIC STUDY OF MULTIPLE EXPERIMENTAL INTESTINAL TUMOURS. *(E.)* Pozharisski, K. M.; Klimashevski, V. F. (N. N. Petrov Res. Inst. Oncol., Leningrad, USSR). *Exp. Pathol. (Jena)* 9(1-2):88-98, 1974.

1,2-dimethylhydrazine (7-40 mg/kg) administered both p.o. and parenterally induced multiple primary tumors in different parts of rat intestine. These neoplasms were of different histological patterns, i.e., tubular, papillary, mucus-secreting and scirrhous adenocarcinomas, and mucous and signet-ring cell carcinomas. Histoautoradiographic study with simultaneous administration of ^{3}H- thymidine and colchicine revealed that individual tumors had different parameters of cell population kinetics. The labeling index for invasive adenocarcinomas of colon varied from 15.5 to 55.2% while the mitotic index, the duration of G$_2$- and S-phases, and generation time ranged between 1.8 and 8.9%, 0.3 and 2.88 hr, 13.8 and 54.5 hr, and 24.5 and 117 hr, resp. The autoradiographic investigation showed that proliferative activity was highest in signet-ring cell carcinomas and lowest in mucinous cancers. Adenocarcinomas had intermediate activity. Differences in cell cycle parameters in neoplasms of the same and of different histological structure are probably due to the trophic conditions of tumor cells. The differences in the parameters of cell population kinetics of tumors of both one histological type and various ones suggest the different times of their appearance and different rates of their growth.

4139 IMMUNOFLUORESCENT LOCALIZATION OF GASTRIN IN RABBIT ANTROPYLORIC MUCOSA TO ARGYROPHIL CELLS EXHIBITING FORMALDEHYDE-OZONE-INDUCED FLUORESCENCE. *(E.)* Larsson, L. I.; Sundler, F.; Hakanson, R.; Rehfeld, J. F.; Stadil, F. (Univ. Lund, Sweden). *Histochemie* 37(1):81-87, 1973.

The cellular localization of gastrin in the rabbit pyloric antrum was established by immunofluorescence. Gastrin was found in the cytoplasm of a large number of epithelial cells in the pyloric gland area. The immunofluorescent cells were characteristically distributed in the basal half of the mucosa. Similar cells were also found scattered in the mucosa of the duodenal bulb, but were far fewer than in the pyloric gland area. The gastrin cell was argyrophil with the Grimelius technique and was identical with a previously described cell type that emits fluorescence upon combined formaldehyde-ozone treatment, a feature that has been interpreted as indicating storage of peptides with NH$_2$-terminal tryptophan. The identity of the peptide and its relation to gastrin is unknown.

4140 TRUNCAL SUBDIAPHRAGMATIC VAGOTOMY AND ITS EFFECTS ON THE RAT PANCREAS AND LIVER IN LONG-TERM EXPERIMENTS. *(Ger.)* Kothe, W.; Albert, H.; Graetz, H.; Nowotny, K. (Surg. Clin., Karl Marx Univ., Leipzig, Germany). *Zentralbl. Chir.* 98(31): 1111-1115, 1973.

4141 AN ULTRASTRUCTURAL STUDY OF THE ETHANOL-INDUCED INHIBITION OF DUODENAL CALCIUM TRANSPORT. *(E.)* Sampson, H. W.; Krawitt, E. L. (Baylor Coll. Dentistry, Dallas, Texas). *Gastroenterology* 66(4):770, 1974.

4142 ENDOSCOPIC BIOPSIES OF NORMAL DUODENAL MUCOSA. *(E.)* Korn, E. R.; Foroozan, P. (Scripps Clin. Res. Fdn., La Jolla, Calif.). *Gastroenterology* 66(4):815, 1974.

4143 ULTRASTRUCTURAL AND ENZYMIC CHARACTERISTICS OF INTESTINAL MICROVILLOUS ROUND BODIES. *(E.)* Humphrey, C. D.; Pittman, F. E.; Pittman, J. C. (Med. Univ. South Carolina, Charleston). *Gastroenterology* 66(4):847, 1974.

4144 EXPERIMENTAL CHRONIC ENDOGENOUS HYPERGASTRINISM ACCOMPANIED BY INCREASED GASTRIN CELL DENSITY. *(E.)* Lehy, T.; Constantin-Voillemot, N.; Dubrasquet, M.; Bonfils, S. (Bichat Hosp., Paris, France). *Gastroenterology* 66(4):850, 1974.

4145 LIVER ULTRASTRUCTURE IN ABETALIPOPROTEINEMIA AND HYPOBETALIPOPROTEINEMIA. *(E.)* Partin, J. C.; Partin, J. S.; Schubert, W. K. (no affil). *J. Clin. Invest.* 53(6):58a, 1974.

4146 MORPHOLOGICAL AND HISTOCHEMICAL STUDY ON THE MAJOR SALIVARY GLANDS OF MICE INJECTED WITH DACTINOMYCIN. *(E.)* Ribeiro, M. C. L.; Fava-De-Moraes, F. (Biomed. Sci. Inst., Univ. Sao Paulo, Brazil). *Acta Anat.* 87(2):248-260, 1974.

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

4147 ELECTRON MICROSCOPE STUDIES OF THE SMOOTH MUSCULATURE OF THE HUMAN STOMACH. LINKAGES BETWEEN MUSCLE CELLS AND THEIR RELATIONSHIP TO COLLAGEN FIBERS. *(Ger.)* Konig, Jr., B. (Inst. Anat., Univ. Campinas, Brazil). *Anat. Anz.* 135(1/2): 47-55, 1974.

4148 UTILIZATION OF THE SAME SPECIMEN OF GASTROINTESTINAL TISSUE FOR BOTH TRANSMISSION AND SCANNING ELECTRON MICROSCOPY. *(E.)* Winborn, W. B.; Guerrero, D. L. (Univ. Texas Health Sci. Ctr., San Antonio). *Gastroenterology* 66(4):871, 1974.

4149 HISTOCHEMICAL CHARACTERISTICS OF THE SMALL INTESTINE MUCOSA UNDER CONDITIONS OF FUNCTIONAL OVERLOADING. *(Rus.)* Kostromin, A. S. (Kiev Sci. Res. Inst. Clin. Exp. Surg., USSR). *Vrach. Delo* (4):36-39, 1974.

See also 4231, 4237, 4311, 4312, 4347, 4348, 4713.

ABSORPTION-EXCRETION-TRANSPORT

4150 PROTEIN UPTAKE BY THE INTESTINE: EVIDENCE FOR ABSORPTION OF INTACT MACROMOLECULES. *(E.)* Warshaw, A. L.; Walker, W. A.; Isselbacher, K. J. (Massachusetts Gen. Hosp., Boston). *Gastroenterology* 66(5):987-992, 1974.

The ability of the mature small intestine to absorb intact protein was studied in adult male albino Charles River rats prepared with duodenal cannulas, mesenteric lymph fistulae, and portal vein cannulas. After infusion of tritium labeled bovine serum albumin (0.5 - 500 mg/kg) into the duodenum, approximately 2% of the albumin was transmitted in macromolecular form into the lymph and blood; the amount of albumin transmitted was directly proportional to the amount administered. The molecular weight of the absorbed macromolecule exceeded 50,000 by Sephadex gel filtration. Absorbed protein was immunologically identified as bovine serum albumin on Ouchterlony plates with monospecific rabbit antibovine serum albumin. The findings offer evidence for the concept that intact protein can transverse the mature intestinal epithelium under physiologic conditions. The significance of such absorption on intact protein is not yet determined. A possible connection in the pathogenesis of cholera, botulism, and inflammatory bowel disease has been postulated.

4151 CALCIUM ABSORPTION OR SECRETION BY RAT ILEUM IN VITRO: EFFECTS OF DIETARY CALCIUM INTAKE. *(E.)* Walling, M. W.; Kimberg, D. V. (Beth Israel Hosp., Boston, Mass.). *Am. J. Physiol.* 226(5):1124-1130, 1974.

Ileum from rats given a 2.0%, high-calcium diet as weanlings, actively secretes calcium into the gut lumen throughout life, while ileum from animals similarly raised on a 0.02%, low-calcium diet actively absorbs calcium only during growth. The kinetics of ileal calcium fluxes suggest that the effect of the low-calcium diet may result in the appearance of a saturable process in both mucosal-to-serosal flux and initial mucosal uptake rates. The calcium-absorptive capacity of the ileum also appears to be increased by a low-calcium diet. No correlation was observed between the direction of net calcium flux (absorption or secretion) and serum calcium levels. Regulation of the direction of net calcium flux appears to be achieved by changes in mucosal-to-serosal flux, rather than by changes in the flux from serosa to mucosa. Active ileal calcium secretion apparently occurs at any time in life when the animal is in an "adequately positive" calcium balance, and active ileal absorption can occur whenever there is a sufficient metabolic need for calcium.

4152 INHIBITION OF ACTIVE HEXOSE AND AMINO ACID TRANSPORT BY CONJUGATED BILE SALTS IN RAT ILEUM. *(E.)* Caspary, W. F. (Dept. Med., Univ. Gottingen, Germany). *Eur. J. Clin. Invest.* 4(1):17-24, 1974.

The effect of conjugated trihydroxy bile salts, taurocholate, glycocholate, and deoxycholate on the tissue uptake and mucosal-to-serosal transfer of actively transported hexoses and amino acids has been examined *in vitro* in the ileum and jejunum of female Wistar rats. Conjugated trihydroxy bile salts and deoxycholate markedly inhibited active transport of hexoses and amino acids in the ileum, whereas deoxycholate alone was inhibitory in the jejunum. The inhibitory effect of tauro- and glycocholate increased with incubation time. It persisted after the tissue had been washed and reincubated with hexoses in a bile salt free medium and could be observed with only 2 x 10^{-4} M taurocholate. Taurocholate increased the transmural potential difference in the ileum but did not affect the potential difference in the jejunum. Preincubation of the ileum with taurocholate depressed subsequent glucose-induced increases in the potential difference. In the jejunum, however, taurocholate did not affect glucose-induced increases in the potential difference. It is concluded that conjugated trihydroxy bile salts have to enter intestinal mucosal epithelial cells to an appreciable extent in order to affect other active, energy-requiring transport systems in rat small intestine. Previous reports that conjugated bile salts failed to inhibit active transport of hexoses and amino acids are understandable since only jejunal transport had been examined.

4153 TRANSPORT OF BOVINE CHYMOTRYPSINOGEN INTO RABBIT PANCREATIC CELLS. *(E.)* Liebow, C.; Rothman, S. S. (Dept. Physiol., Univ. California, San Francisco). *Am. J. Physiol.* 226(5):1077-1081, 1974.

Chymotrypsinogen uptake was measured into slices of rabbit pancreas incubated in bovine ^{3}H-chymotrypsinogen and ^{131}I-albumin. Chymotrypsinogen uptake was 16 times greater than that for albumin. ^{3}H-chymotrypsinogen was not readily "chased" by washing in cold chymotrypsinogen. Exogenous enzyme was distributed within the cell like endogenous enzyme, i.e., zymogen granules had the highest specific radioactivity. Enzyme entered the cytoplasm more rapidly than the zymogen granules. After 60 min, both fractions approached tracer equilibration while mitochondrial and microsomal fractions were still far below bath specific radioactivity, suggesting that these enzyme pools exchanged relatively freely with media. The existence of enzyme equilibrium between bath-cytoplasm-zymogen granules suggests bidirectional processes, at least one of which appears to involve the transport of proteins across plasma membrane by nonexocytotic mechanisms.

4154 BRUSH-BORDER PROCESSES AND TRANSEPITHELIAL Na AND Cl TRANSPORT BY RABBIT ILEUM. *(E.)* Nellans, H. N.; Frizzell, R. A.; Schultz, S. G. (Univ. Pittsburgh Sch. of Med., Pa.). *Am. J. Physiol.* 226(5):1131-1141, 1974.

The effects of Cl^- replacement on bidirectional Na^+ fluxes and Na^+ replacement on bidirectional Cl^- fluxes across short-circuited, stripped rabbit ileum were determined under control conditions and in the presence of 10 mM theophylline. Under control conditions, both Na^+ and Cl^- are actively absorbed. Replacement of Cl^- with $SO_4^=$ reduces but does not abolish active Na^+ absorption. Replacement of Na^+ with choline abolished active Cl^- absorption. Theophylline markedly increased intracellular cyclic adenosine monophosphate levels and at the same time abolished net Na^+ movements and elicited active Cl^- secretion. In the presence of theophylline, replacement of Na^+ with choline abolished active Cl^- secretion, and replacement of Cl^- with $SO_4^=$ restored active Na^+ absorption. These results are consistent with the presence of a neutral, reversible NaCl transport mechanism at the mucosal membranes, which is capable of mediating NaCl influx as well as NaCl efflux across these membranes, together with a Cl^--independent, theophylline-insensitive Na^+ influx mechanism. The effects of theophylline can be explained by postulating that elevated intracellular cyclic adenosine monophosphate levels inhibit NaCl influx *via* the coupled mechanism and unmask the neutral NaCl efflux process. Studies on the serosa-to-mucosa unidirectional flux of Na^+ as a function of the transepithelial potential difference are consistent with the notion that this movement is attributable to strict ionic diffusion in the presence and absence of theophylline and is probably confined to the extracellular shunt pathway.

4155 SODIUM ION TRANSPORT IN ISOLATED INTESTINAL EPITHELIAL CELLS: THE EFFECT OF ACTIVELY TRANSPORTED SUGARS ON SODIUM ION EFFLUX. *(E.)* Gall, D. G.; Butler, D. G.; Tepperman, F.; Hamilton, J. R. (Hosp. Sick Children, Toronto, Canada). *Biochim. Biophys. Acta* 339(3):291-302, 1974.

The effect of actively transported sugars on Na^+ efflux from isolated rat jejunal epithelial cells was examined to evaluate the mechanism by which actively transported nonelectrolytes stimulate Na^+ absorption. Glucose, galactose, and 3-*O*-methylglucose, sugars known to be actively transported by the small intestine, stimulate total Na^+ efflux from isolated epithelial cells. This stimulation results from an increase of active Na^+ transport, since it is inhibited by ouabain. Glucose stimulation is significantly greater than that produced by galactose or 3-*O*-methylglucose. 2-Deoxyglucose, a sugar that is not actively transported, has no effect on total Na^+ efflux from isolated cells. Phlorizin, which has no effect on Na^+ efflux in a sugar-free medium, completely abolishes the effect of galactose. These findings support the hypothesis that the increase in intestinal absorption of Na^+ in the presence of actively transported nonelectrolytes occurs by a transcellular route; and are consistent with the ion-gradient model. The results are not compatible with the direct energy-coupling model.

4156 FUNCTIONAL CHARACTERIZATION OF DIPEPTIDE TRANSPORT SYSTEM IN HUMAN JEJUNUM. *(E.)* Adibi, S. A.; Soleimanpour, M. R. (Montefiore Hosp., Pittsburgh, Pa.). *J. Clin. Invest.* 53(5):1368-1374, 1974.

Jejunal segments (15 cm) from 18 human volunteers were perfused with test solutions containing varying amounts of glycylglycine, glycylleucine, glycine, leucine, glycylglycine with leucine or glycine, glycylglycine with glycylleucine, or glycylleucine with an equimolar mixture of free glycine and leucine. Jejunal absorption rates of both glycylglycine and glycylleucine followed the kinetics of a saturable process. The transport kinetics of dipeptides were characterized by higher V_{max} values than those of free amino acids. While jejunal absorption rates of glycylglycine were not significantly affected by free leucine or free glycine, they were competitively inhibited by glycylleucine. The jejunal absorption rate of glycylleucine was not significantly altered by an equimolar mixture of free glycine and leucine. The selective absorption of dipeptides was investigated by infusing 3 equimolar mixtures, each containing 2 different dipeptides. Among the 3 dipeptides examined, glycylgycine was the least absorbed. There was no significant difference between the absorption of glycylleucine and leucylglycine. The data suggest that dipeptide absorption is mediated by a carrier which is not shared with free neutral amino acids. Both COOH- and NH_2-terminal amino acids are important in determining the characteristics of dipeptide absorption.

4157 THE FAILURE OF INDOMETHACIN TO MODIFY THE RESPONSE OF CAT SMALL INTESTINE TO CHOLERA ENTEROTOXIN. *(E.)* Dlugolecka, M. J. (Dept. Pharmacol., Univ. Edinburgh, Scotland). *Pol. J. Pharmacol. Pharm.* 26(1-2):93-100, 1974.

The effect of 2 prostaglandin synthesis inhibitors and anti-inflammatory drugs were studied in a series of 21 cats in which the terminal small intestine was challenged with cholera toxin. Neither indomethacin (10, 50, and 100 mg/kg i.v., 600 μg/loop administered locally) nor aspirin (25 mg/kg i.v.) was able to modify fluid secretion in toxin-treated loops. It is concluded that prostaglandins are not likely to be mediators of the fluid loss observed in the terminal small intestine.

4158 CALCITONIN AND INTESTINAL CALCIUM ABSORPTION. *(E.)* Swaminathan, R.; Ker, J.; Care, A. D. (Dept. Animal Physiol., Univ. Leeds, England). *J. Endocrinol.* 61(1):83-94, 1974.

The effect of calcitonin on small intestinal calcium absorption was studied using Thiry-Vella loops in one intact sheep, one intact pig, and three parathyroidectomized pigs. After recirculating through the loop a known volume of a solution containing calcium and polyethylene glycol 4000, net calcium absorption rate was measured. Calcitonin was infused i.v. and its effect on the net calcium absorption rate was measured. An initial rise in net calcium absorption associated with hypocalcemia, followed by a marked reduction in calcium absorption was noted after relatively high doses of calcitonin, 10 mμ/min/kg, were infused for up to 45 hr. The increase in the net absorption rate was either not observed or was less marked, when smaller doses of calcitonin, 0.5 mμ/min/kg, were infused for 100 hr. However, there was a significant reduction in net calcium absorption 2 days after the calcitonin infusion was stopped. Both intact and parathyroidectomized animals showed a reduction in net calcium absorption rate. In an experiment in which the true absorption rate of calcium from lumen to blood was measured using ^{47}Ca, a reduction in unidirectional transfer of calcium from lumen to blood was noted 2 days after the calcitonin infusion stopped. It was concluded that i.v. infusion of calcitonin for prolonged periods of time reduced absorption of calcium from the intestine, perhaps by inhibiting conversion of 25 hydroxycholecalciferol to 1,25-dihydroxycholecalciferol, thus leading to a reduction in intestinal calcium binding protein. This may indicate a role for calcitonin in calcium homeostasis during the ingestion of a high calcium diet.

4159 REDUCTION OF HYPERCHYLOMICRONEMIA (TYPE V) BY INGESTION OF AN INHIBITOR OF INTESTINAL ALKALINE PHOSPHATASE. *(E.)* Linscheer, W. G. (VA Hosp., Syracuse, N.Y.). *Gastroenterology* 66(4):732, 1974.

4160 SOME FACTORS INFLUENCING ABSORPTION RATES OF THE DIGESTION PRODUCTS OF PROTEIN AND CARBOHYDRATE FROM THE PROXIMAL JEJUNUM OF MAN AND THEIR POSSIBLE NUTRITIONAL IMPLICATIONS. *(E.)* Cook, G. C. (Dept. Med., Univ. Zambia, Lusaka). *Gut* 15(3):239-245, 1974.

4161 EFFECT OF PENTAGASTRIN AND GLUCAGON ON WATER, ELECTROLYTE, AND GLUCOSE ABSORPTION IN THE HUMAN JEJUNUM. *(Ger.)* Ewe, K.; Laubenthal, G.; Hoditz, U. (1st Med. Clin., Univ. Mainz, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:845-847, 1973.

4162 INHIBITION BY PROSTAGLANDINS OF FLUID TRANSPORT IN THE ISOLATED GALLBLADDER OF THE GUINEA-PIG. *(E.)* Morton, I. K. M.; Saverymuttu, S. M.; Wood, J. R. (Dept. Pharmacol., King's Coll., London, England). *Br. J. Pharmacol.* 50(1):460P, 1974.

4163 EVIDENCE FOR ACTIVE TRANSPORT OF THE TRIPEPTIDE GLYCYLSARCOSYLSARCOSINE BY HAMSTER JEJUNUM IN VITRO. *(E.)* Addison, J. M.; Burston, D.; Matthews, D. M.; Payne, J. W.; Wilkinson, S. (Westminster Hosp., London, England). *Clin. Sci. Mol. Med.* 46(6):30P, 1974.

4164 FOLIC ACID: A NEW APPROACH TO THE MECHANISM OF ITS INTESTINAL ABSORPTION. *(E.)* Elsborg, L. (Dept. Med. II., Univ. Aarhus, Denmark). *Dan. Med. Bull.* 21(1):1-11, 1974.

4165 RATE OF GLUCONEOGENESIS AND INTRACELLULAR CONCENTRATIONS OF INTERMEDIATES IN ISOLATED RAT HEPATOCYTES. *(E.)* Gimpel, J. A.; Zimmerman, U.-J. P. (Johnson Res. Fdn., Univ. Pennsylvania, Philadelphia). *Fed. Proc.* 35(5):1893, 1974.

4166 EFFECT OF OUABAIN ON GASTRIC MUCOSAL ACTIVE TRANSPORT. *(E.)* Shanbour, L. L.; Kuo, Y.-M.; Bowen, J. C.; Smith, J.; Sernka, T. J.; Jacobson, E. D. (Univ. Texas Med. Sch., Houston). *Gastroenterology* 66(4):865, 1974.

4167 THE ABILITY OF SODIUM RICINOLEATE TO INHIBIT WATER TRANSPORT AND SMOOTH MUSCLE CONTRACTILITY IN VITRO. *(E.)* Gaginella, T. S.; Stewart, J. J.; Bass, P. (Univ. Wisconsin Ctr. Health Sci., Madison). *Gastroenterology* 66(4):840, 1974.

4168 THE EFFECTS OF PEPTIDE HORMONES ON SIMULTANEOUS JEJUNAL AND ILEAL H_2O AND ELECTROLYTE TRANSPORT IN THE DOG: II. GLUCAGON: SOME PARADOXICAL EFFECTS. *(E.)* Moore, E. W.; Tavano, P. J. (Health Sci. Div., Virginia Commonwealth Univ., Richmond). *Gastroenterology* 66(4):749, 1974.

4169 EFFECT OF CHRONIC ADMINISTRATION OF CHOLECYSTOKININ-PANCREOZYMIN (CCK-PZ) ON PANCREATIC MACROMOLECULAR TRANSPORT. *(E.)* Singh, M.; (Med. Coll. Georgia, Augusta). *Gastroenterology* 66(4):877, 1974.

4170 INTESTINAL FATTY ACID BINDING PROTEIN (FABP): STUDIES OF PHYSIOLOGICAL FUNCTION. *(E.)* Ockner, R. K.; Manning, J. A. (Univ. California, San Francisco). *Gastroenterology* 66(4):858, 1974.

4171 REGIONAL DIFFERENCES IN THE EFFECT OF BILE SALTS ON WATER ABSORPTION BY THE INTESTINE. *(E.)* Saunders, D. R. (Dept. Med., Univ. Washington, Seattle). *Gastroenterology* 66(4):864, 1974.

4172 EFFECTS OF VARIOUS BILE SALTS ON ISOLATED AMPHIBIAN GASTRIC MUCOSA. *(E.)* Silen, W.; Forte, J. G. (Harvard Med. Sch., Boston, Mass.). *Gastroenterology* 66(4):866, 1974.

4173 EFFECT OF PERFUSION RATE ON LUMINAL PRESSURE AND ON THE RATE OF UREA AND GLUCOSE ABSORPTION (WITH AND WITHOUT NaCl) IN THE RAT ILEUM IN VIVO. *(E.)* Lewis, L. D.; Fordtran, J. S. (Univ. Texas Southwestern Med. Sch., Dallas). *Gastroenterology* 66(4):877, 1974.

4174 INTESTINAL ABSORPTION OF VITAMIN D-3. *(E.)* Hollander, D. (Albany Med. Coll., N.Y.). *Gastroenterology* 66(4):712, 1974.

4175 THE EFFECT OF PHENOBARBITAL (PB) ON THE INTESTINAL ABSORPTION OF CHOLIC ACID (CA). *(E.)* Ostrower, V. S.; Coan, P.; Kern, Jr., F. (Univ. Colorado Med. Ctr., Denver). *Gastroenterology* 66(4):757, 1974.

4176 DUAL SYSTEM OF THIAMINE TRANSPORT: CHARACTERISTICS AND EFFECT OF ETHANOL. *(E.)* Hoyumpa, A.; Middleton, H.; Wilson, F.; Schenker, S. (Vanderbilt Univ., Nashville, Tenn.). *Gastroenterology* 66(4):714, 1974.

4177 THE EFFECTS OF PEPTIDE HORMONES ON SIMULTANEOUS JEJUNAL AND ILEAL H_2O AND ELECTROLYTE TRANSPORT IN THE RABBIT: I. GLUCAGON: THE NATURE OF THE EFFECT. *(E.)* Moore, E. W.; Longacher, J. W. (Virginia Commonwealth Univ., Richmond). *Gastroenterology* 66(4):748, 1974.

4178 THE EFFECT OF PROSTAGLANDIN E_2 (PGE_2) ON NET JEJUNAL TRANSPORT AND MEAN TRANSIT TIME. *(E.)* Mize, B. F.; Wu, W. C.; Whalen, G. E. (Wood VA Ctr., Milwaukee, Wis.). *Gastroenterology* 66(4):747, 1974.

4179 THE EFFECTS OF PEPTIDE HORMONES ON SIMULTANEOUS JEJUNAL AND ILEAL H_2O AND ELECTROLYTE TRANSPORT IN THE DOG: III. ANGIOTENSIN: MORE OF THE SAME PARADOXICAL EFFECTS. *(E.)* Moore, E. W.; Dowla, M. U. (Virginia Commonwealth Univ., Richmond). *Gastroenterology* 66(4):749, 1974.

4180 HYPOTHESIS: GLUCAGON AND ANGIOTENSIN EFFECTS ARE MEDIATED BY CARRIER DE-DIMERIZATION AND MONOMER INHIBITION: AN EXTENSION OF THE CRANE ION-CARRIER MODEL. *(E.)* Moore, E. W.; Osborne, C. V. (Virginia Commonwealth Univ., Richmond) *Gastroenterology* 66(4):750, 1974.

4181 DIFFERENTIAL RESPONSE OF THE HUMAN SMALL AND LARGE INTESTINE TO PROSTAGLANDIN F_2. *(E.)* Newman, A.: Milton-Thompson, G.; Cummings, J. H.; Billings, J. A.; Misiewicz, J. J. (Central Middlesex Hosp., London, England). *Gastroenterology* 66(4):754, 1974.

4182 EFFECT OF ASPIRIN, ALCOHOL AND PEPSIN ON MUCOSAL PERMEABILITY OF ESOPHAGEAL MUCOSA. *(E.)* Shirazi, S. S.; Zike, W. L.; Brubacher, M.; DenBesten, L. (Univ. Iowa Coll. Med., Iowa City). *Gastroenterology* 66(4):777, 1974.

4183 GASTRIC MUCOSAL BARRIER: (LITHIUM AS AN INDEX OF H^+ BACK-DIFFUSION). *(E.)* Horowitz, I.; Chapman, M.; Rudick, J.; Janowitz, H.; Werther, L. (Mt. Sinai Hosp., New York, N.Y.). *Gastroenterology* 66(4):713, 1974.

4184 EVIDENCE FOR CATALYTIC REGULATION OF IRON ABSORPTION BY INTESTINAL MUCOSA. *(E.)* Wells, M. S.; Chow, K. F.; Awad, Jr., W. M. (no affil.). *J. Clin. Invest.* 53(6):83a, 1974.

4185 PROPERTIES OF THE PASSIVE CONDUCTANCE PATHWAY ACROSS IN VITRO RAT JEJUNUM. *(E.)* Munck, B. G.; Schultz, S. G. (Univ. Pittsburgh Sch. Med., Pa.). *J. Membrane Biol.* 16(2):163-174, 1974.

See also 4141, 4247, 4254, 4332, 4579.

MOTILITY

4186 ELECTRICAL AND MOTOR ACTIVITY OF HUMAN AND DOG COLON IN VITRO. *(E.)* Vanasin, B.; Ustach, T. J.; Schuster, M. M. (Baltimore City Hosp., Md.). *Johns Hopkins Med. J.* 134(4):201-210, 1974. 134(4):201-210, 1974.

Simultaneous recordings of electrical and motor activity from resected specimens of human and canine colon demonstrated the sporadic nature of both types of activity. In the human colon, there were two electrical slow wave gradients: a gradient of decreasing frequency from the cecum to the transverse colon; and gradient of increasing frequency from the transverse colon to the distal rectum. The electrical activity originated in the taenia coli and spread to the intervening longitudinal and circular muscle. In the rectum, which contains no taenia, the electrical activity began in the longitudinal muscle and spread to the circular muscle. In the dog, whose entire colon lacks taenia coli, there was a single gradient of increasing frequency in a cephalocaudal direction; the electrical activity originated in the longitudinal muscle and spread to the circular muscle. Differences between the small intestinal and colonic activities can be correlated with the different embryological origins, innervations, and functions of these two organs.

4187 EFFECT OF INTRADUODENAL ADMINISTRATION OF ESSENTIAL AMINO ACIDS AND SODIUM OLEATE ON MOTOR ACTIVITY OF THE SIGMOID COLON. *(E.)*

Meshkinpour, H.; Dinoso, Jr., V. P.; Lorber, S. H. (Temple Univ. Health Sci. Ctr., Philadelphia, Pa.). *Gastroenterology* 66(3):373-377, 1974.

The effects of the intraduodenal administration of solutions of essential amino acids and 5% sodium oleate on the motor activity of the sigmoid colon were studied in 11 normal subjects and in one patient with a previous antrectomy. A marked increase in motor activity was observed during the administration of both solutions in all subjects. The i.v. perfusion of pentagastrin (0.6 μg/kg/hour) in six subjects did not significantly influence the motor activity of the sigmoid colon. The data suggest that the increased motor activity in the sigmoid colon which is observed in response to exposure of the duodenum to essential amino acids and sodium oleate could result from the release of endogenous cholecystokinin.

4188 THE ACTION OF CHOLECYSTOKININ AND RELATED PEPTIDES ON GUINEA PIG SMALL INTESTINE.

(E.) Yau, W. M.; Makhlouf, G. M.; Edwards, L. E.; Farrar, J. T. (Med. Coll. Virginia, Richmond). *Can. J. Physiol. Pharmacol.* 52(2):298-303, 1974.
col. 52(2):298-303, 1974.

The mode of action of cholecystokinin (CCK), cerulein, pentagastrin, and an octapeptide fragment of CCK on isolated guinea pig muscle was investigated, and the relative potencies of the four peptides compared. On a molar basis, octapeptide-CCK and cerulein were about twice as potent as CCK, whereas pentagastrin and Urecholine were 23 and 46 times less potent, respectively. Scopolamine (6.84×10^{-1} M) inhibited the response to all four peptides relatively less than the response to Urecholine. Tetrodoxin (0.1 μg/ml) inhibited the response to all peptides by 91%. The effect of these peptides on ileal muscle was largely mediated by cholinergic mechanisms. However, it was not clear whether the effect resulted solely from the release of acetylcholine by nerve endings or from the participation of acetylcholine mainly as a synergist of the peptides' action on smooth muscle fibers.

4189 DIFFERENTIATION OF THE CONTRACTILE EFFECTS OF PROSTAGLANDIN E_2 AND THE C-TERMINAL OCTAPEPTIDE OF CHOLECYSTOKININ IN ISOLATED GUINEA-PIG GALLBLADDER. *(E.)*

Andersson, K. E.; Hedner, P.; Persson, C. G. A. (Dept. Pharmacol., Univ. Lund, Sweden). *Acta Physiol. Scand.* 90(4):657-663, 1974.

In the isolated guinea-pig gallbladder, contractions were induced by acetylcholine, the C-terminal octapeptide of cholecystokinin, prostaglandin E_2, and the prostaglandin precursor arachidonic acid. The effects on these contractions induced by the inhibitor of the prostaglandin synthesis, indomethacin, and of the prostaglandin antagonists, polyphoretin phosphate, and SC 19220 [1-acetyl-2-(8-chloro-10,11-dihydrobenz(b,f)(1,4)oxazepine-10-carbonyl)hydrazine], were investigated. Indomethacin (0.5 μg/ml) inhibited the response to arachidonic acid but did not appreciably affect contractions induced by the other agents. Indomethacin (10 μg/ml) reduced the responses to all the agonists, probably due to a non-specific depressive effect. Polyphloretin phosphate (1-10 μg/ml) had no effects on the elicited contractions. In concentrations of 100-400 μg/ml, polyphloretin phosphate caused a transient contraction in gallbladder strips and reduced the response to the agonists used. SC 19220 (2 and 8 μg/ml) selectively inhibited the responses of arachidonic acid and prostaglandin E_2 but had little or no effect on contractions induced by acetylcholine and the C-terminal octapeptide. Inhibition of the response to prostaglandin E_2 could be overcome by increasing the bath concentration of the prostaglandin 5-100-fold. It is concluded that local synthesis and release of prostaglandins play no essential role in mediation of the contractile effect of the C-terminal octapeptide of cholecystokinin in guinea-pig gallbladder.

4190 THE EFFECTS OF PROSTAGLANDIN A_2 (PGA_2) ON THE GUINEA-PIG ISOLATED ILEUM. *(E.)*

Straczkowski, W.; Kalicinski, A.; Nowak, W.; Malofiejew, M. (Med. Acad., Bialystok, Poland). *Pol. J. Pharmacol. Pharm.* 26(1-2):253-255, 1974.

Segments of isolated guinea-pig ileum were suspended in an organ bath of oxygenated Tyrode solution containing various concentrations of prostaglandin A_2 at 37 C. Above threshold doses of 25-50 ng/ml, prostaglandin A_2 induced transient contraction of isolated guinea-pig ileum, followed by an increase in its tonus. Submaximal contractions were proportional to the logarithm of the dose of prostaglandin A_2. Addition of atropine (2×10^{-7}g/ml), antazoline (10^{-7}g/ml), or lysergic acid diethylamide (10^{-8}g/ml) to the bath had no effect on the action of prostaglandin A_2. Therefore, the effect of prostaglandin A_2 does not appear to be mediated by acetylcholine, histamine, or serotonin and the corresponding receptors are not involved. Since bradykinin-induced contractions of the ileum were enhanced by incubation with prostaglandin A_2, one of the physiological functions of the prostaglandins may be to modify the effects of some biologically active polypeptides.

4191 EFFECT OF GASTRIC DISTENTION ON MOTILITY AND PLASMA GASTRIN CONCENTRATION BEFORE

AND AFTER SECRETIN ADMINISTRATION. *(E.)* Schrumpf, E.; Stadaas, J. (Ulleval Univ. Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(2):119-122, 1974.

Gastric motility and plasma gastrin concentrations were measured in 6 healthy adults before and after stepwise distention of the stomach and after the i.v. infusion of secretin (3 U/kg/hr in 0.9% NaCl). Plasma gastrin levels were not significantly changed by distention or secretin administration, but gastric motility was significantly increased by increasing distention. The contractile activity consisted predominantly of type II pressure peaks, but slow pressure waves resembling type III gastric pressure waves were also seen. The basal pressure was essentially unchanged by distention. Administration of secretin caused pronounced inhibition of motor activity in the stomach. Rhythmic contractions completely disappeared, leaving only basal pressure recordings which showed insignificant variations with volume increments and secretin infusion. Thus, the motility-reducing effect of secretin is independent of changes in the plasma gastrin level.

4192 THE EFFECTS OF GRADED DOSES OF C-TERMINAL OCTAPEPTIDE OF CHOLECYSTOKININ ON SMALL INTESTINAL TRANSIT TIME IN MAN. *(E.)* Levant, J. A.; Kun, T. L.; Jachna, J.; Sturdevant, R. A. L.; Isenberg, J. I. (VA Wadsworth Hosp. Ctr., Los Angeles, Calif.). *Am. J. Dig. Dis.* 19(3):207-209, 1974.

In 6 male subjects without gastrointestinal disease, graded i.v. doses of the C-terminal octapeptide of cholecystokinin produced graded decreases in small intestinal transit time. Mean transit time decreased from a control value of 130 minutes after 0.15 M NaCl to 81, 65, and 19 min after 5, 10, and 20 ng/kg resp. of the octapeptide. Side effects (nausea and abdominal discomfort) were minimal and transient, lasting less than 3 min, and the radiographic appearance of the small intestine remained unchanged.

4193 THE EFFECT ON GASTRIC EMPTYING OF TEST MEALS WITH VARIOUS FAT AND OSMOLAR CONCENTRATION. *(E.)* Moberg, S.; Carlberger, G. (St. Erik's Hosp., Stockholm, Sweden). *Scand. J. Gastroenterol.* 9(1):29-32, 1974.

The gastric emptying of fluid meals with various fat and osmolar concentrations was studied in healthy volunteers. The emptying pattern was composed of an initial phase characterized by a rapid rate, followed by a prolonged second phase having an approximately constant rate and lasting until the stomach is almost empty. When fat-free meals were given, osmotic load on the duodenum decreased the emptying rate during the initial phase. On the other hand, fat in the meals decreased the emptying rate during the prolonged phase.

4194 THE INFLUENCE OF LONG-TERM INTERMITTENT EXPOSURES TO HYPOXIA ON GASTRIC EMPTYING TIME IN RATS. *(E.)* Fang, H. S.; Chen, C. F. (Coll. Med., Natl. Taiwan Univ., Taipei, China). *Space Life Sci.* 4(3/4):335-337, 1973.

The effect of long-term intermittent exposures to hypoxia corresponding to an altitude of 18,000 feet on gastric emptying time was studied roentgenologically under normal oxygen tension. If male Long-Evans rats were exposed to hypoxia for 3 hr/day for 60 days, there was a marked decrease in gastric emptying time to an average of 0.86 hr, as compared to 1.29 hr in the control group. Long-term intermittent exposures might cause dominance of the parasympathetic nervous system in rats. If acclimatization-induced parasympathetic dominance does occur, it would be reasonable to expect an increased gastric motility resulting in an acceleration of the emptying time of the stomach.

4195 BLOCKADE BY PROSTAGLANDINS E_2 AND $F_{1\alpha}$ OF THE RESPONSE OF THE RABBIT ILEUM TO STIMULATION OF SYMPATHETIC NERVE AND ITS REVERSAL BY SOME ANTIHISTAMINES, DEXAMPHETAMINE AND METHYLPHENIDATE. *(E.)* Abdel-Aziz, A. (Dept. Pharm., Alexandria Univ., Egypt). *Eur. J. Pharmacol.* 25(2):226-230, 1974.

Prostaglandins E_2 and $F_{1\alpha}$, 0.05-1.0 µg/ml, blocked the inhibitory response of the isolated rabbit ileum to stimulation of periarterial nerve, without affecting responses to noradrenaline. The activity had a quick onset, did not increase much with time, and was more effective in blocking responses to stimulation of periarterial nerves at low frequencies (3, 5 and 7 shocks/sec) than at high frequencies (10, 20, and 60 shocks/sec). The effect was easily reversed by brief washing, by raising the calcium ion concentration, or by addition of dexamphetamine, methylphenidate, chlorpheniramine, or diphenhydramine, but not antazoline. Blockade by the prostaglandins most probably functions through reduction in the amount of the transmitter noradrenaline released.

4196 POTENTIATION OF THE BIPHASIC BRADYKININ RESPONSE OF THE GUINEA-PIG ILEUM. *(E.)* Hall, D. W. R.; Bonta, I. L. (Med. Fac., Erasmus Univ., Rotterdam, Netherlands). *Arch. Int. Pharmacodyn. Ther.* 207(2):361-372, 1974.

Cysteine, 2,3-dimercaptopropanol (BAL), α-thiol glycerol, and a synthetic pentapeptide (pyroglutamyllysyltryptophanylalanylproline, $BPP_{5\alpha}$) identical to one of the bradykinin potentiating factors isolated from the venom of *Bothrops Jararaca*, were examined for their effects on the bradykinin relaxation and contraction of the acetylcholine-contracted guinea pig ileum. Each of the substances potentiated bradykinin relaxation and contraction. Cysteine potentiated the bradykinin relaxation at concentrations between 10^{-5} to 10^{-4} M, while potentiation of the contraction occurred at 10^{-4} to 10^{-2} M. With BAL, potentiation of the relaxation response was observed between 10^{-6} to 10^{-5} M and potentiation of the contraction between 10^{-5} and 10^{-4} M. Both substances were up to 10 times more potent at potentiating the bradykinin relaxation than the contraction. There was no potency difference for relaxation and contraction with α-thiol glycerol or BPP$_{5\alpha}$. High concentrations of cysteine and BAL produced inconsistent effects, some potentiating and others reducing the bradykinin responses. High concentrations of cysteine (10^{-3} and 10^{-2}) potentiated acetylcholine contraction, while BAL (10^{-3}M) reduced it. It is suggested that there are 2 discrete receptors for bradykinin relaxation and contraction of the acetylcholine-contracted guinea-pig ileum.

4197 EFFECTS OF GYMNODINIUM BREVE TOXIN ON THE SMOOTH MUSCLE PREPARATION OF GUINEA-PIG ILEUM. *(E.)* Grunfeld, Y.; Spiegelstein, M. Y. (Israel Inst. Biol. Res., Ness-Ziona). *Br. J. Pharmacol.* 50(3):399-404, 1974.

4198 ELECTRIC PACING OF THE INTACT AND TRANSECTED CANINE SMALL BOWEL. *(E.)* Akari, O. E.; Kelly, K. A.; Code, C. F. (Mayo Clin., Fdn., Rochester, Minn.). *Gastroenterology* 66(4):658, 1974.

4199 DIGESTA FLOW AND ORGANIC ACID PRODUCTION IN THE GASTROINTESTINAL TRACT OF THE PIG. *(E.)* Clemens, E. T.; Stevens, C. E. (New York State Vet. Coll., Cornell Univ., Ithaca). *Gastroenterology* 66(4):677, 1974.

4200 THE ELECTRICAL "OFF RESPONSE" OF CAT ESOPHAGEAL SMOOTH MUSCLE: A STUDY OF ITS CHARACTERISTICS AND AN ANALOG SIMULATION. *(E.)* Chan, W. W. L. (Toronto Western Hosp., Canada). *Gastroenterology* 66(4):655, 1974.

4201 AN INHIBITORY INNERVATION AT THE GASTRODUODENAL JUNCTION. *(E.)* Anuras, S.; Cooke, A. R.; Christensen, J. (Dept. Internal Med., Univ. Iowa, Iowa City). *Gastroenterology* 66(4):660, 1974.

4202 EFFECT OF EXERCISE ON GASTRIC EMPTYING AND GASTRIC SECRETION. *(E.)* Ramsbottom, N.; Hunt, J. N. (Guy's Hosp. Med. Sch., London, England). *Digestion* 10(1):1-8, 1974.

4203 THE ROLE OF THE DUODENAL INFUSATE ON GASTRIC EMPTYING MEASURED BY THE E.M.G. OF GASTRIC MUSCLE. *(E.)* Bell, F. R.; Grivel, M. L. (Roy. Vet. Coll., London, England). *J. Physiol.* 239(1):48P, 1974.

4204 INFLUENCES ON GASTROINTESTINAL AND BLADDER MOTILITY BY THE FASTIGIAL NUCLEUS. *(E.)* Lisander, B.; Martner, J. (Dept. Physiol., Univ. Goteborg, Sweden). *Acta Physiol. Scand.* 90(4):792-794, 1974.

4205 PACING THE SMALL INTESTINAL ELECTRICAL CONTROL ACTIVITY (ECA). *(E.)* Sarna, S. K.; Daniel, E. F. (Dept. Pharmacol., Univ. Alberta, Edmonton, Canada). 66(4):771, 1974.

See also 4167, 4178, 4453, 4605.

SECRETION AND METABOLISM

4206 THE SIGNIFICANCE OF THE TROPHIC ACTION OF GASTRIN. *(E.)* Johnson, L. R.; Castro, G. A.; Lichtenberger, L. M.; Copeland, E. M.; Dudrick, S. J. (Univ. Texas Med. Sch., Houston). *Gastroenterology* 66(4):718, 1974.

4207 GASTRIN, SECRETIN, METIAMIDE AND HISTAMINE ON MUCOSAL DNA SYNTHESIS. *(E.)* Johnson, L. R.; Guthrie, P. D. (Univ. Texas Med. Sch., Houston). *Gastroenterology* 66(4):718, 1974.

4208 POTENTIATION OF CHOLECYSTOKININ-PANCREOZYMIN (CCK-PZ) ACTION BY HYPERCALCEMIA IN MAN. *(E.)* Malagelada, J. R.; Holtermuller, K. H.; Sizemore, G. W.; Go, V. L. W. (Mayo Clin., Rochester, Minn.). *Gastroenterology* 66(4):738, 1974.

SECRETION AND METABOLISM

Stomach

4209 EFFECT OF BILATERAL NEPHRECTOMY AND BILATERAL URETERAL LIGATION ON SERUM GASTRIN LEVELS IN THE RAT. *(E.)* Davidson, W. D.; Moore, T. C.; Shippey, W.; Conovaloff, A. J. (UCLA Sch. Med., Los Angeles, Calif.). *Gastroenterology* 66(4):522-525, 1974.

Serum gastrin activity was determined in male Sprague-

Dawley rats 48 hr after bilateral nephrectomy or bilateral ureteral ligation. Although both groups of rats became equally azotemic as indicated by their serum urea nitrogen levels, the serum gastrin levels were significantly elevated only in the animals which had sustained bilateral nephrectomies. These data indicate that hypergastrinemia due to renal failure is related to the loss of normal functioning renal mass and is not a result of the uremic state per se, and that the kidney is a major site of endogenous gastrin degradation in the rat.

4210 SECRETIN-INDUCED INHIBITION OF ACID SECRETION BEFORE AND AFTER VAGAL DENERVATION OF CANINE GASTRIC POUCHES.

(E.) Sjodin, L.; Miura, S. (Karolinska Inst., Stockholm, Sweden). *Scand. J. Gastroenterol.* 9(2):185-190, 1974. 185-190, 1974.

The inhibitory effect of secretin on pentagastrin-stimulated acid secretion was studied in mongrel dogs before and after transformation of vagally innervated fundic pouches (Pavlov type) into vagally denervated pouches (Heidenhain type). A high dose of secretin (3.0 U/kg/hr) profoundly inhibited ecretion from both types of pouches, whereas a wer dose (0.75 U/kg/hr) produced a significant ibition only in the Heidenhain pouches. Ure-ine reduced the inhibitory effect of secretin entagastrin-stimulated secretion from vagally vated pouches. When the fundic mucosa is vag- innervated, endogenous secretin appears to be of le or no importance as an inhibitor of gastric l secretion under physiological conditions. sin output evoked by combinations of penta-rin and secretin was low compared with that duced by a single infusion of Urecholine. The siological significance of the stimulatory effect ecretin on pepsin secretion remains to be est-shed.

11 THE EFFECT OF ENDOGENOUS SECRETIN AND CHOLECYSTOKININ ON PENTAGASTRIN-STIMULATED NNERVATED AND DENERVATED GASTRIC MUCOSA.

(E.) Dorighi, J. A.; Kaminski, D. L.; Willman, V. L. (St. Louis Univ. Sch. Med., Mo.). *Surgery* 75(5): 755-762, 1974.

The inhibition of pentagastrin-stimulated H^+ output by endogenous secretin and cholecystokinin (CCK) was evaluated in dogs with chronic gastric fistulas (innervated mucosa) and Heidenhain pouches (denervated mucosa). The release of endogenous secretin was stimulated by intraduodenal HCl, and endogenous CCK release was stimulated by intraduodenal elemental amino acids. The effectiveness of these methods in stimulating duodenal hormone release was confirmed in dogs with chronic pancreatic fistulas. Endogenous CCK produced no inhibition of pentagastrin-stimulated H^+ output from innervated or denervated mucosa. The intraduodenal amino acids produced a pancreatic response similar to but greater than that produced by 2 U/kg/hr of exogenous CCK; they did not inhibit the acid secretory response. Endogenous secretin was an effective enterogastrone which significantly inhibited the pentagastrin-stimulated H^+ response in innervated and denervated mucosa. The percent inhibition in the innervated mucosa was significantly greater at all intraduodenal H^+ doses than that produced in the denervated gastric mucosa. The results indicate that vagal section decreases the effectiveness of the duodenal enterogastrone.

4212 INCREASED GASTRIN RELEASE FOLLOWING PENETRATING CENTRAL NERVOUS SYSTEM INJURY.

(E.) Bowen, J. C.; Fleming, W. H.; Thompson, J. C. (Univ. Texas Med. Sch., Houston). *Surgery* 75(5):720-724, 1974.

Serum gastrin levels were determined by radioimmunoassay in 39 severely injured servicemen (18 to 30 years old) following either central nervous system (CNS) injury (16 patients) or non-CNS injury (23 patients). The serum gastrin concentrations were significantly elevated following CNS injury; five patients with either penetrating cerebral or spinal cord injuries had mean serum gastrin levels greater than 150 pg/ml. The serum gastrin levels were not increased in the non-CNS injury group. Ten of the non-CNS injury group and eight of the CNS injury group developed stress ulcers. Although the data suggest that there may be a difference in serum gastrin levels between those with and without stress ulcers in the CNS injury group, the findings were not statistically significant. A single patient in the CNS injury group with consistently high serum gastrin levels did not develop evidence of upper gastrointestinal bleeding. Thus, CNS-related stress ulcer may be a distinct pathophysiological entity from the non-CNS related stress ulcer, and the vagal release of gastrin may have clinical significance in humans after some forms of CNS injury.

4213 EFFECT OF ATROPINE ON PLASMA CONCENTRATION OF GASTRIN IN FASTING SUBJECTS.

(E.) Schrumpf, E.; Myren, J. (Ulleval Univ. Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(2):123-125, 1974.

The effect of atropine (0.01 mg/kg, i.v.) on the basal gastrin level, acid secretion, and gastric pH was studied in five normal subjects and eight patients with achlorhydria and hypergastrinemia (two patients also had pernicious anemia). Following the s.c. injection of 6 µg/kg pentagastrin, the basal acid output (BAO) and maximal acid output (MAO) were zero in the patient group; the values were 3.5 + 1.0 and 24.3 + 2.4 mEq/h, respectively, in the normals. In the normal, there was a considerable decrease in the gastric output with a concomitant elevation in the pH of the gastric juice following atropine. Atropine had no effect on the basal gastrin level in the normals, but it caused a significant decrease in the basal gastrin level in the achlorhydric patients. The data suggest that there is a cholinergic influence on basal gastrin release in achlorhydric patients.

4214 EFFECTS OF CHOLECYSTOKININ, SECRETIN, 2-DEOXY-D-GLUCOSE AND INSULIN ON

ENTAGASTRIN-STIMULATED GASTRIC SECRETION IN ISTULA CHICKENS. *(E.)*

Burhol, P. G. (Ulleval osp., Oslo, Norway). *Scand. J. Gastroenterol.* (1):55-58, 1974.

he effect of cholecystokinin, secretin, 2-eoxy-D-glucose, and insulin on pentagastrin-timulated gastric secretion was studied in 14 istula chickens. Cholecystokinin elicited a rief rise in gastric water and H$^+$ secretion nd a sustained inhibition of pepsin secretion. ecretin also raised the gastric secretion f water temporarily, but caused insignificant hanges in gastric H$^+$ and pepsin secretion. -deoxy-D-glucose showed a late increase in he gastric water and H$^+$ secretion, but an nsignificant rise in pepsin secretion. Insulin aused a sustained inhibition not only of astric water and H$^+$ but of pepsin secretion s well. The significant inhibition of the entagastrin-stimulated pepsin secretion by nsulin and the lack of significant inhibition f basal pepsin secretion may be taken to uggest that a dual mechanism is involved in he gastric inhibition by insulin. It is herefore possible that insulin inhibits not nly by a direct action on the gastric transport f water and H$^+$, but also by interfering with he interaction between pentagastrin and the astric secretory cells, and so to produce an nhibiton of the pentagastrin-stimulated epsin secretion as well.

4215 DUODENAL ACIDIFICATION AND ANTRAL RELEASE OF GASTRIN. *(E.)*

Becker, . D.; Evans, J. C.; Reeder, D. D.; Thompson, J. . (Univ. Texas Med. Br., Galveston). *Arch. Surg.* 108(2):205-207, 1974.

The antrofundal junction of the stomach was clamped and the pylorus was ligated in 11 dogs. A 0.2% solution of acetylcholine chloride was allowed to flow into the antrum *via* a double-lumen catheter. In 5 dogs, the entire duodenum was perfused with an acid solution (pH 1.0) *via* catheters located in the duodenal bulb and just proximal to the ligament of Treitz. In the remaining 6 dogs, the proximal or distal portion of the duodenum was perfused with acid *via* catheters placed proximal and distal to the entrance of the main pancreatic duct. In both groups, irrigation of the antrum with acetylcholine increased the secretion of gastrin from the antrum. Acid perfusion of the entire duodenum promptly decreased the concentration of gastrin in the peripheral serum, while an increase in the pH of the perfusate to pH 7.0 resulted in a stepwise increase in the peripheral serum gastrin concentration. Acidification of the distal portion of the duodenum decreased gastrin levels in the antral venous outflow, as did acidification of the proximal portion of the duodenum. Thus, the inhibitory effect of duodenal acidification is at least partially explained by inhibition of gastrin release from the antrum.

4216 PROOF OF A PYLORO-OXYNTIC REFLEX FOR STIMULATION OF ACID SECRETION. *(E.)*

Debas, H. T.; Konturek, S. J.; Walsh, J. H.; Grossman, M. I. (VA Wadsworth Hosp. Ctr., Los Angeles, Calif.). *Gastroenterology* 66(4):526-532, 1974.

In 7 dogs with innervated antral pouches, gastric fistulas, and Heidenhain pouches, acid secretion and serum gastrin (radioimmunoassay) were measured in response to distention of the antral pouch with 0.1 M NaHCO$_3$ or 0.1 M HCL at 0- 40-cm pressure. Distention with 0.1 M NaHCO$_3$ caused graded increases in the serum gastrin concentration and in the output of acid from both the gastric fistula and the Heidenhain pouch. Acidification of the antral pouch abolished the release of gastrin and secretion of acid from the Heidenhain pouch in response to distention, but did not abolish acid secretion from the gastric fistula. These results indicate that antral distention causes acid secretion by at least 2 mechanisms, only one of which is gastrin-dependent. Proof that the gastrin-independent mechanism is a pyloro-oxyntic reflex was obtained by showing that vagal denervation of the antral pouch completely abolished the response of the gastric fistula to distention of the antral pouch with acid. In addition to abolishing the pyloro-oxyntic reflex, antral vagal denervation also decreased the increment in serum gastrin caused by alkaline antral distention and increased the amount of acid secreted in response to any given increment in serum gastrin.

4217 THE EFFECT OF DRUGS INTERFERING WITH BIOGENIC AMINE METABOLISM ON BASAL GASTRIC SECRETION IN THE RAT. *(E.)*

Hano, J.; Bugajski, J.; Danek, L. (Dept. Pharmacol., Polish Acad. Sci., Krakow). *Pol. J. Pharmacol Pharm.* 25(6):537-549, 1973.

The influence of drugs that interfere with catecholamine and serotonin metabolism on basal gastric secretion was investigated in Wistar rats with chronic gastric fistulas. Exogenous dopamine suppressed the secretion of HCl and reduced pepsin output. Drugs that stabilize or increase the level of endogenous dopamine, e.g., α-methyl-p-tyrosine, disulfiram, and dimethyldithiocarbamate, also inhibited the secretion of HCl and pepsin. Inhibition of dopamine synthesis by administration of DL-α-methyl-p-tyrosine, however, unexpectedly failed to increase gastric secretion. Epinephrine reduced HCl output as much as 90%, mainly by decreasing the total volume of the gastric secretion, not by prevention of acid formation. Inhibitory actions of norepinephrine and isoproterenol were less that that of epinephrine. The inhibition of serotonin synthesis by p-chlorphenylalanine unexpectedly resulted in a strong reduction of gastric secretory activity, affecting the concentration and the total output of HCl and the content of pepsin. Nialamide reduced gastric secretion for a short time due, possibly, to a blockade of degradation mainly of dopamine. Imipramine, considered to increase catecholamines, also caused a decreased gastric secretion by all parameters studied.

4218 A HYPOCALCEMIC AGENT CONTAINING GASTRIN FROM DISTAL PORTIONS OF THE STOMACH IN MAN AND IN THE RAT. *(E.)*

Aliapoulios, M. A.; O'Neil, E. R.; Hori, C. G. (Harvard Med. Sch., Cambridge, Mass.). *Am. J. Surg.* 127(1):65-70, 1974.

Specimens of undiseased distal stomach from numerous Holtzman rats and from 25 consecutive patients were extracted. Extracts from rat stomach were assayed directly for hypocalcemic and gastrin activities, using thyrocalcitonin and pentagastrin, resp., as reference standards. Human stomach extracts were first lyophilized overnight to concentrate the active substances. For maximal effect in the assay for hypocalcemic activity, parathyroid hormone was first administered to assay rats in doses of 76 USP units 5 hours prior to the administration of the test extracts, and determination of serum calcium by EDTA titration was then carried out one quarter to two hours subsequent to injection of test extracts. Gastrin analysis of the extracts was performed by radioimmunoassay. The stomach from 6 week old rats on a normal diet caused significant hypocalcemia at doses of 200 mg, wet weight tissue extract, per assay rat at 1 or 2 hours or both after injection. The serum calcium differences from values of control rats untreated with stomach extract ranged from 0.37 to 1.21 mg/100 ml. An experiment testing the stomach of rats which had been fasted 20 hours demonstrated, however, no significant hypocalcemia with this same dose. Human stomach samples from 20 to 23 patients who were fasted prior to routine surgery for ulcer or cancer caused hypocalcemic responses at doses of 400 to 1,600 mg wet weight tissue extract 1 hour after injection in the test animals. Comparisons of stomach samples of the antrum in 8 patients divided into interior and exterior portions, indicated that the interior portion only in 5 patients and both portions in 2 patients caused significant hypocalcemia. Dialysis and ether extraction had no influence on the hypocalcemic effect of the extract. Analysis of extracts for gastrin content demonstrated the presence of 2,400 pg per 800 mg of wet weight human stomach and 2,000 pg per 200 mg of wet weight rat stomach extract. It is concluded that rat and human stomachs contain hypocalcemic substance(s) which may assist in regulating the serum calcium level at times of dietary calcium loads.

4219 THE EFFECTS OF THYROCALCITONIN ON GASTRIC ACID SECRETION IN INTACT AND THYROIDECTOMIZED THYROXIN-SUBSTITUTED GASTRIC FISTULA CATS. *(E.)*

Nordgren, C. E.; Nyhus, L. M.; Bombeck, C. T. (Univ. Illinois Coll. Med., Chicago). *Scand. J. Gastroenterol.* 9(1):103-109, 1974.

A single injection of thyrocalcitonin inhibited the stimulation of gastric secretion in the chronic fistula cat by injections of 2-deoxy-D-glucose or by constant infusion of pentagastrin and histamine in submaximal doses. Thyroidectomized as well as intact cats were studied and both groups showed similar responses to gastric stimulants. Thyrocalcitonin inhibited gastric secretion briefly in both groups, and there was an additional late inhibition of gastrin- and histamine-stimulated secretion in the thyroidectomized animals. A small dose of thyrocalcitonin did not inhibit pentagastrin-stimulated secretion in the thyroidectomized cats. No significant change in serum calcium concentration was observed. It was suggested, however, that the action of thyrocalcitonin which was observed may, nevertheless, have been due to the local reduction of available calcium necessary for the release or effect of acetylcholine in the secretory mechanism.

4220 EFFECT OF SEROTONIN AND ATROPINE ON RESERPINE-INDUCED GASTRIC SECRETION IN RATS. *(E.)*

Bugajski, J.; Hano, J.; Wantuch, C. (Dept. Pharmacol., Polish Acad. Sci., Krakow). *Pol. J. Pharmacol. Pharm.* 25(6):525-535, 1973.

The effect of serotonin and atropine on reserpine-induced gastric secretion and gastric ulcer development was investigated in Wistar rats with chronic gastric fistulas. Reserpine (2.5 or 5.0 mg/kg) 3 to 4 hr after injection, increased the HCl concentration but decreased the volume of secretion. Serotonin (1.0 or 5.0 mg/kg) or atropine (0.05 mg/kg), administered simultaneously with reserpine, 2.0 or 5.0 mg/kg, strongly reduced the output of HCl and pepsin. This was accomplished by reduction of volume of secretion, not concentration. Serotonin doubled, however, the number and diameter of reserpine-induced gastric ulcers, while atropine did not influence their development. The potentiating effect of serotonin was, therefore, independent of mechanisms of gastric acid and pepsin formation.

4221 STUDIES OF TWO TRITERPENOID COMPOUNDS ON THE GASTRIC MUCOSAL BARRIER: AN EXPERIMENTAL STUDY WITH CANINE HEIDENHAIN POUCHES. *(E.)*

Calcraft, B. J.; Rhodes, J.; Cross, S.; Hole, D.; Aubrey, A. (Univ. Hosp. Wales, Cardiff). *Am. J. Dig. Dis.* 19(3):243-252, 1974.

The protective action of 2 closely related triterpenes (lauroyl glycyrrhetinic acid and carbenoxolone) against mucosal damage by bile acid was examined in Heidenhain pouches of 4 dogs. The net fluxes of hydrogen and sodium ion were measured before, during and after exposure of the mucosa to a 10 mM bile acid solution at pH 2, and gastric transmucosal potential difference also was measured during these experiments. With exposure of the mucosa to bile, hydrogen ion back-diffusion from and sodium gain by the pouch were significantly increased and the potential difference fell. However, when the pouches were first treated with either lauroyl glycyrrhetinic acid or carbenoxolone, the bile-induced net increase in back-diffusion of hydrogen ion was significantly decreased while the changes in the net sodium flux and in the potential difference were the same as in the untreated pouches.

4222 EFFECT OF SEVERAL DRUGS ON GASTRIC POTENTIAL DIFFERENCE IN MAN. *(E.)* Murray, H. S.; Strottman, M. P.; Cooke, A. R. (Univ. Hosp., Univ. Iowa, Iowa City). *Br. Med. J.* 1(5896):19-21, 1974.

Measurement of gastric mucosal potential difference was used to determine the effect on gastric mucosal barrier of several drugs known to provoke ulcers. Studies were carried out with 6 volunteers, with 9 rheumatoid arthritis patients being treated with long-term aspirin, and with 5 arthritis patients on long-term prednisone. Unbuffered aspirin and ethanol "broke" the barrier as shown by a rapid fall in potential difference. The effects of unbuffered aspirin were dose related, with 600 mg causing a greater fall in potential difference than 300 mg. The effects of unbuffered aspirin and ethanol given together were additive and caused the greatest fall. Sodium acetylsalicylate (buffered aspirin) did not however, alter the normal potential difference. Indomethacin, phenylbutazone, and prednisone also failed to cause any change in potential difference. The patients on long-term unbuffered aspirin or long-term prednisone had readings within the normal range and responded the same as normal subjects to acute challenge with aspirin or prednisone. The studies thus show that unbuffered aspirin and ethanol will damage the gastric mucosal barrier but that buffered aspirin, indomethacin, phenylbutazone, and prednisone do not.

4223 EXTRACTION OF CIRCULATING ENDOGENOUS GASTRIN BY THE GASTRIC FUNDUS. *(E.)* Evans, J. C. W.; Reeder, D. D.; Becker, H. D.; Thompson, J. C. (Roy. Infirm., Bristol, England). *Gut* 15(2): 112-115, 1974.

Serum gastrin was determined by radioimmunoassay in 14 dogs in samples obtained simultaneously from the arterial inflow and venous outflow of the gastric fundus. Under basal conditions, transit of the gastric fundus resulted in no change in gastrin concentrations. During antral stimulation with 0.1% acetylcholine, 9 of the 14 dogs demonstrated a significant increase in gastric acid secretion. Acid production increased from a basal value of 0.10 mEq/30 min to a maximum of 0.93 mEq/30 min. In these 9 dogs the arterial concentration of serum gastrin was significantly higher (approximately 30%) than the venous concentration. There was no significant arteriovenous difference in gastrin concentration in the 5 dogs exhibiting no gastric secretory response to antral stimulation. It is concluded that the gastric fundus is an important site for the inactivation of stimulated levels of circulating gastrin.

4224 THE EFFECT OF CORTICOTROPHINE AND CORTISONE ON ARYLSULPHATASE ACTIVITY IN STOMACH MUCOSA OF RATS. *(E.)* Kozlowska, K. (Med. Sch., Gdansk, Poland). *Endokrinologie* 62(3):359-362, 1973.

Changes in the activity of the stomach mucosa arylsulfatases were studied in male Wistar rats treated with cortisone or ACTH (five 25 mg doses injected i.p. every 2 hours). Both hormones increased the arylsulfatase activity in the fundic and pyloric regions of the stomach, the increase seen with ACTH being more marked. With neither hormone was the increase statistically significant. The data showed no correlation between the lysosomal arylsulfatase activity in the stomach mucosa and the increase in sulfated polysaccharides seen after the application of ACTH and cortisone. The increase in sulfated polysaccharides could be an expression of their intensified synthesis rather than a decrease in their catabolism.

4225 INHIBITION OF ACID SECRETION IN DOG BY METIAMIDE, A HISTAMINE ANTAGONIST ACTING ON H_2 RECEPTORS. *(E.)* Grossman, M. I.; Konturek, S. J. (VA Wadsworth Hosp. Ctr., Los Angeles, Calif.). *Gastroenterology* 66(4):517-521, 1974.

Histamine, pentagastrin, or 2-deoxyglucose were given by continuous i.v. infusion to two dogs with Heidenhain pouches and gastric fistulas. Metiamide (2.9 mg/kg) or atropine sulfate (0.1 mg/kg) were given by rapid i.v. injection 90 min after commencement of the stimulant infusions. Metiamide, but not atropine, inhibited histamine-stimulated acid secretion from both the gastric fistula and the Heidenhain pouch. Both metiamide and atropine inhibited pentagastrin-stimulated acid secretion from the main stomach and the Heidenhain pouch. The inhibition produced by atropine was more pronounced and lasted longer. Similarly, both metiamide and atropine inhibited 2-deoxyglucose-stimulated acid secretion from the main stomach (this stimulant had little effect on acid secretion from the Heidenhain pouch), with atropine producing a greater and more lasting response. The increase in acid secretion induced by liver extract infusion was as great as that induced by pentagastrin in the main stomach and twice as great as that induced by pentagastrin in the Heidenhain pouch. Both metiamide and atropine inhibited liver extract-stimulated acid secretion in the main stomach and the Heidenhain pouch, the inhibition by atropine being greater and longer lasting. The data suggest an interaction between the parietal cell receptors for histamine, gastrin, and acetylcholine.

4226 INHIBITORY EFFECT OF BROMAZEPAM ON BASAL AND BETAZOLE-STIMULATED GASTRIC ACID SECRETION IN MAN. *(E.)* Stacher, G.; Starker, D. (1st Surg. Clin., Univ. Vienna, Austria). *Gut* 15(2):116-120, 1974.

Basal as well as betazole-stimulated (1.7 mg/kg s.c.) gastric acid secretion in 6 healthy subjects (4 women and 2 men with an average age of 22.9 yr) was reduced after administration of bromazepam (0.1 mg/kg i.v.). In subjects staying awake the reduction was limited to the first two 15-min periods after injection. The reduction was highly significant in subjects who fell asleep after receiving the drug, with the low level of secretory output maintained as long as sleep lasted. After wakening there was a sharp and highly significant rise. Acid secretion in subjects who fell asleep after the simultaneous administration of betazole and bromazepam was significantly higher than after the administration of bromazepam alone. Acid secretion during natural sleep did not differ during that during bromazepam-induced sleep. Sleep by itself is apparently a more potent inhibitor of gastric secretion than bromazepam alone.

4227 ACTION OF BURIMAMIDE, A HISTAMINE ANTAGONIST, ON ACID SECRETION IN VITRO.

(E.) Shoemaker, R. L.; Buckner, E.; Spenney, J. G.; Sachs, G. (Dept. Physiol., Med., Univ. Alabama, Birmingham). *Am. J. Physiol.* 226(4):898-902, 1974.

Burimamide (5-butylmethylthiourea, 10^{-3}M) completely inhibited spontaneous acid secretion in *Rana pipiens* gastric mucosa *in vitro*. Burimamide also inhibited acid secretion stimulated by histamine (10^{-3} M), mecholyl (10^{-5} M), or pentagastrin (10^{-5} M). Aminophylline (10^{-2} M) prevented this inhibition, and only histamine (in a 1/100 M ratio to burimamide) and dibutyryl cyclic AMP (10^{-3} M) reversed inhibition induced by burimamide. These data support a sequential model for acid secretion involving an adenyl cyclase as a critical step.

4228 CALCITONIN INHIBITION OF GASTRIN SECRETION IN MAN.

(E.) Oyama, T.; Shiraki, M.; Ito, H.; Tanaka, K.; Orimo, H. (Tokyo Metropolitan Geriatric Hosp., Japan). *Endocrinol. Jap.* 20(6): 625-627, 1973.

Porcine calcitonin (4 and 40 MRC U, i.v.) caused a marked fall in serum immunoreactive gastrin in 9 patients (aged 60-72 yr) with chronic nonendocrine disorders. The fall was dose-related and was significantly greater following 40 MRC U than after 4 MRC U. A significant fall in serum immunoreactive gastrin also occurred in 5 patients (aged 65-86 yr) given i.m. injections of 40 MRC U porcine calcitonin. There were no significant changes in serum calcium in either group. These results, together with previous findings of decreased serum gastrin in patients with medullary carcinoma of the thyroid, are evidence for a suppressive effect of calcitonin on gastrin secretion.

4229 STIMULATION OF ACID AND PEPSIN SECRETION IN THE FISTULA DOG BY 4(5)-METHYL HISTAMINE, A SPECIFIC H-2 AGONIST.

(E.) Hirschowitz, B. I.; Gibson, R.; Hitchinson, G. (Univ. Alabama Med. Ctr., Birmingham). *Am. J. Dig. Dis.* 19(4): 307-314, 1974.

Gastric acid and pepsin responses to graded doses of 4-methyl histamine (5-200 μg/kg/hr i.v.) were studied in 3 gastric fistula dogs with intact vagal innervation. 4-Methyl histamine, a specific agonist for the H-2 receptor of the gastric parietal cell, stimulated about 3 times more pepsin than did histamine. With regard to H^+ response, there were no unique differences between the 2 drugs other than metabolic half-life. The lag time between start of stimulus infusion and onset of secretion was comparable (10-20 min) as were the time taken to reach peak response (45-90 min), peak output (10 mEq/15 min), rate of fade (30% in 2 hr), dose giving near-maximum response (100 μg/kg/hr), and kinetic parameters V_{max} (45 mEq/hr) and K_m (11.8 μg/kg/hr for 4-methyl histamine and 12.4 μg/kg/hr for histamine). After infusion of 4-methyl histamine was stopped, H^+ secretion declined exponentially with time, and the half-time of this slope was linearly proportional to dose. At all doses, the decay of response was several times slower than with histamine, representing the only difference between the 2 drugs as regards gastric acid secretion in the dog.

4230 EFFECT OF CALCITONIN ON MEAL-STIMULATED GASTRIC ACID SECRETION AND SERUM GASTRIN CONCENTRATION.

(E.) Bieberdorf, F. A.; Gray, T. K.; Walsh, J. H.; Fordtran, J. S. (Univ. Texas Southwestern Med. Sch., Dallas). *Gastroenterology* 66 (3):343-346, 1974.

Gastric acid secretion and serum gastrin and calcium concentrations were measured in 5 normal subjects (23 to 45 yr old) during the first 2 hr after ingestion of a normal meal. Each subject was studied three times, once after an i.v. saline infusion, and twice after the infusion of synthetic salmon calcitonin (SCT, 0.25 and 1.0 Medical Research Council U/kg/hr). During infusion with the smaller dose of SCT, the gastric acid secretory rates were slightly depressed, while after the larger dose they were markedly depressed. SCT suppressed acid secretion to the same extent during the first and second hours after eating. Neither dose of SCT had a detectable effect on the total serum calcium concentration. The postprandial serum gastrin concentrations were similar during saline and SCT infusions. Two of the subjects had diarrhea for the first few hours after the larger dose of SCT; no side effects were noted after the smaller dose of SCT or saline. The data indicate that SCT suppresses meal-stimulated acid secretion by a mechanism other than inhibition of the serum immunoreactive gastrin response.

4231 ULTRASTRUCTURE OF ARGENTOPHILS CELLS OF THE GASTRIC FUNDUS GLANDS UNDER THE INFLUENCE OF PHARMACOLOGIC STIMULATING AND INHIBITING AGENTS.

(E.) Sokolowska-Halliop, J. (Med. Acad., Lublin, Poland). *Folia Morphol. (Warsz.)* 32(4): 469-479, 1973.

The argentophil cells of the stomach were studied in 36 male guinea pigs divided into a control group and 8 experimental groups. In 4 groups, the animals were injected s.c. with atropine sulfate (1 mg/kg) and in 4 groups with pilocarpine hydrochloride (10 mg/

kg). Paralysis of parasympathetic nerve endings with atropine caused structural changes in the mitochondria, smooth and rough endoplasmic reticula, and nucleoplasm, indicating depression of secretory function. Stimulation of parasympathetic nerve endings with pilocarpine first enhanced and then depressed metabolic processes, as reflected by cytoplasmatic structural changes.

4232 EFFECT OF METIAMIDE, A HISTAMINE H_2-RECEPTOR ANTAGONIST, ON MUCOSAL BLOOD FLOW AND SERUM GASTRIN LEVELS. *(E.)* Konturek, S. J.; Tasler, J.; Obtulowicz, W.; Rehfeld, J. F. (Med. Acad., Krakow, Poland). *Gastroenterology* 66(5): 982-986, 1974.

In dogs with gastric fistulae and vagally denervated Heidenhain pouches, metiamide, a histamine H_2-receptor antagonist, (12 μmol/kg/hr i.v.) inhibited near maximal acid responses to histamine, pentagastrin, bethanechol, or a peptone meal. Atropine sulfate (0.12 μmol/kg/hr i.v.) did not significantly affect acid output induced by histamine, but was a more effective inhibitor of acid secretion stimulated by pentagastrin, bethanechol, or a peptone meal. Serum gastrin response to a peptone meal was unchanged by metiamide but partly suppressed by atropine. The inhibitory effect of metiamide was always associated with a marked reduction in mucosal blood flow. The ratio of the aminopyrine concentration in gastric juice to that in plasma was not significantly changed by metiamide, indicating that the persistent reduction in gastric mucosal blood flow was secondary to an inhibition of gastric secretion.

4233 PSYCHIC CONTROL OF GASTRIC ACID: RESPONSE TO ANTICIPATED FEEDING AND BIOFEEDBACK TRAINING IN A MAN. *(E.)* Moore, J. G.; Schenkenberg, T. (VA Hosp., Salt Lake City, Utah). *Gastroenterology* 66(5):954-959, 1974.

The psychic influence of appetizing meals on gastric acid secretion was assessed in a healthy 25-yr-old male. A significant increase in acid secretion occurred after he was exposed to appetizing meals in a banquet setting. The anticipation of an appetizing meal, with or without the banquet proceeding, appeared to be the most important underlying factor in stimulating acid secretion. He was able to significantly reduce acid secretion in anticipation of a meal only when he was threatened with denial of the meal. He was unable to increase acid secretion on command above the already elevated secretory rates observed when he was anticipating a meal reward. Attempts at self-control of acid secretion in the absence of food cues and with the aid of biofeedback techniques revealed that he was able on command to increase or decrease acid secretion.

4234 EFFECT OF PROSTAGLANDIN-E_2 ON GASTRIC SECRETION AND ON GASTRIC CIRCULATION OF TOTALLY ISOLATED EX VIVO CANINE STOMACH. *(E.)* Kowalewski, K.; Kolodej, A. (Univ. Alberta, Edmonton, Canada). *Pharmacology* 11(2):85-94, 1974.

Totally isolated canine stomachs, perfused with homologous blood, were used to study the effect of prostaglandin E_2 on gastric secretion and circulation. *Ex vivo* stomachs were stimulated by a constant infusion of histamine (150 μg/hr) into the gastric artery. When histamine-induced secretion was stabilized, prostaglandin E_2 was introduced intra-arterially for 1 hr in doses of 500, 250, and 125 μg/hr. After 1 hr, prostaglandin E_2 infusion was interrupted, but histamine stimulation continued. Prostaglandin E_2 significantly inhibited the output of gastric juice, HCl, and pepsin and reduced the concentration of HCl. The effect of prostaglandin E_2 on gastric secretion persisted and became even more pronounced after it was discontinued. Prostaglandin E_2 had a potent vasodilator effect on gastric circulation: it reduced gastric peripheral resistance and the gastric arterial perfusion pressure. This hemodynamic effect of prostaglandin E_2 disappeared after prostaglandin E_2 infusion was discontinued.

4235 GASTRIN DELIVERY TO THE GASTRIC MUCOSA AND GASTRIC ACID SECRETION. *(E.)* Blair, E. L.; Grund, E. R.; Reed, J. D.; Shaw, B. (Dept. Physiol., Univ. Newcastle upon Tyne, England). *Acta Hepatogastroenterol.* 21:80-81, 1974.

4236 COMPARATIVE EFFECTS OF ASPIRIN AND ACETAMINOPHEN (TYLENOL) ON H^+ BACK DIFFUSION. *(E.)* Peter, E. T.; Medina, F.; Fischer, R. P. (VA Hosp., Albuquerque, N.M.). *Gastroenterology* 66(4):759, 1974.

4237 DIRECT EFFECT OF ETHANOL ON THE FUNCTION AND MORPHOLOGY OF PARIETAL CELL IN DOGS. *(E.)* Sharma, R. N.; Escoffery, R.; Chey, W. Y. (Genesee Hosp., Rochester, N.Y.). *Gastroenterology* 66(4):776, 1974.

4238 DETERMINATION OF PROTEOLYTIC ACTIVITY OF GASTRIC JUICE BY AN AUTOMATIC METHOD. *(Fr.)* Vagne, M.; Daniere, S.; Perret, G.; Desvigne, A. (Edouard Herriot Hosp., Lyon, France). *Pathol. Biol. (Paris)* 22(4):359-364, 1974.

See also 4191, 4199, 4202, 4249, 4280, 4500, 4529, 4574.

4239 THE EFFECT OF PROSTAGLANDIN E$_1$ ON EXOCRINE PANCREATIC SECRETION (IN VIVO AND IN VITRO. *(E.)* Gabryelewicz, A.; Szalaj, W.; Kinalska, I.; Stasiewicz, J.; Langiewicz, J. (Med. Acad., Bialystok, Poland). *Pol. J. Pharmacol. Pharm.* 26 (1/2):263-267, 1974.

An increase of enzyme secretion into medium and cell respiration was observed during incubation of guinea-pig pancreatic slices in Krebs phosphate buffer with cholecystokinin-pancreozymin and prostaglandin E$_1$ (PGE$_1$). PGE$_1$ induced an increase in pancreatic enzymes output in the rat *in vivo* and in the guinea-pig *in vitro*, but this effect was statistically significant only for amylase in the *in vivo* experiments. However, PGE$_1$ markedly augmented the secretion of pancreatic enzymes stimulated by cholecystokinin-pancreozymin in anesthetized rats. *In vitro*, PGE$_1$ did not affect release of enzymes stimulated by cholecystokinin-pancreozymin. The increased discharge of pancreatic enzymes into rat duodenum after administration of PGE$_1$ can be associated with its relaxing effect on muscles within the pancreaticobiliary tract. It is concluded that the effect of PGE$_1$ on exocrine pancreatic secretion investigated *in vivo* is probably affected by changes induced in pancreatic blood flow.

4240 EFFECT OF VAGOTOMY ON HORMONES STIMULATING PANCREATIC SECRETION. *(E.)* Konturek, S. J.; Becker, H. D.; Thompson, J. C. (Univ. Texas Med. Branch, Galveston). *Arch. Surg.* 108(5):704-708, 1974.

The effect of truncal vagotomy on the intestinal release of secretin, cholecystokinin, and gastrin, and on their action on pancreatic secretion, was studied in conscious mongrel dogs with chronic gastric and pancreatic fistulas. Vagotomy caused a substantial reduction of pancreatic exocrine secretion in response to the intraduodenal instillation of hydrochloric acid, amino acids, and oleic acid soap, but did not affect pancreatic secretion induced by exogenous secretin or cholecystokinin. This suggests that vagal innervation plays a permissive role in the release of these hormones from the intestinal mucosa but does not interact with them at the level of the pancreatic secretory cells. Vagotomy resulted in a substantial increase in the basal serum gastrin level, but it impaired gastrin release caused by intestinal stimulants, which indicates that the release of intestinal gastrin may also be under cholinergic control.

4241 EARLY DISSOCIATION OF PROTEIN SYNTHESIS AND AMYLASE SECRETION FOLLOWING HORMONAL STIMULATION OF THE PANCREAS. *(E.)* Mongeau, R.; Couture, Y.; Dunnigan, J.; Morisset, J. (Sherbrooke Univ., Quebec, Canada). *Can. J. Physiol. Pharmacol.* 52(2):198-205, 1974.

The secretion of the various pancreatic enzymes can be increased by hormonal and cholinergic stimulation. Synthesis of the enzymes may be modified or remain constant according to different metabolic conditions. The secretion and synthesis of the pancreatic proteins were studied in parallel to determine if secretion triggers synthesis or if both phenomena are controlled by separate mechanisms. The stimulants were injected *in vivo* and the pancreatic secretions were collected for different periods of time. The animals were then sacrificed and protein synthesis was measured *in vitro* along with the amylase secreted into the incubation medium. The results show that protein synthesis is decreased during the first 15 minutes after a single injection or infusion of both cholecystokinin-pancreozymin and secretin. This reduction was associated with an increase in amylase secreted into the incubation medium. However, at 30 minutes after the hormonal stimulation, protein synthesis is increased while secretion into the incubation medium had returned to control levels. This increase in protein synthesis lasts for at least 1 hour. These results strongly suggest that pancreatic enzyme secretion and synthesis are dissociated in the early minutes following hormonal stimulation.

4242 BIOCHEMICAL REACTIONS INVOLVED IN PANCREATIC ENZYME SECRETION. I. ACTIVATION OF THE ADENYLATE CYCLASE COMPLEX. *(E.)* Beaudoin, A. R.; Marois, C.; Dunnigan, J.; Morisset, J. (Sherbrooke Univ., Quebec, Canada). *Can. J. Physiol. Pharmacol.* 52(2):174-182, 1974.

Pancreatic amylase secretion was studied using an *in vitro* system. Secretion was increased by urecholine and cholecystokinin-pancreozymin. Addition of tetracaine and dibucaine to the medium abolished secretion stimulated by urecholine and decreased by 75% that stimulated by cholecystokinin-pancreozymin. In contrast, an increase in enzyme secretion was observed after dibutyryl cyclic AMP; this was potentiated by tetracaine added to the medium. Oxygen uptake by pieces of pancreatic tissue was not affected by tetracaine. Adenylate cyclase activity, increased *in vitro* when cholecystokinin-pancreozymin was added to a pancreas homogenate, was inhibited by 15% by tetracaine at 2 mM and by 67.5% at the 10 mM concentration. From known data of biochemical reactions associated with the process of secretion and the results described, a model is indicated for the activation of the pancreatic adenylate cyclase complex. Associated with the depolarization of the acinar cell plasma membrane by urecholine and cholecystokinin-pancreozymin and an inward movement of sodium and calcium, there is an immediate rise in adenylate cyclase activity within 10 seconds which is timed with the initiation of amylase secretion.

4243 INHIBITORY EFFECT OF GLUCAGON ON HUMAN PANCREATIC SECRETION. *(Ger.)* Steffen, C.; Goebell, H.; Baltzer, G.; Durr, H. K. (Med. Clin., Univ. Marburg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1423-1425, 1972.

Pancreatic secretion was investigated in 19 normal fasting volunteers (11 men and 8 women with an average age of 40 yr) for 1 hr after stimulation with secretin or secretin-pancreozymin (1 clinical U/kg/hr) nd for another hr after infusion of glucagon (1 or mg/75 kg/hr). Glucagon was infused for 1 hr at he beginning of the test in 5 subjects. Although lucagon had little effect on the volume of pancreatic uice secreted or on bicarbonate secretion, trypsin, hymotrypsin, and lipase secretion was inhibited by 0-60%, depending upon the dose of glucagon employed. hen 5 mg/75 kg/hr glucagon was infused together ith secretin and pancreozymin, enzyme secretion was low from the start and only increased 15 min after iscontinuation of glucagon infusion. No change ccurred in serum calcium levels during glucagon in- usion, but blood sugar concentrations increased sig- ificantly. These findings suggested that glucagon oes not act directly on pancreatic enzyme secretion, ut might act by liberating calcitonin. However, his hypothesis was disproved by experiments per- ormed on anesthetized dogs which demonstrated that otal thyroidectomy did not eliminate the inhibitory ffect of glucagon on pancreatic enzyme secretion. nother possibility is that glucagon causes changes n cell permeability for calcium, resulting in an ntracellular calcium deficiency which inhibits en- yme secretion.

4244 SECRETION OF DIGESTIVE ENZYME DERIVED FROM TWO PARALLEL INTRACELLULAR POOLS. *(E.)* Rothman, S. S.; Isenman, L. D. (Dept. Physiol., Univ. California, San Francisco). *Am. J. Physiol.* 226(5):1082-1087, 1974.

Both methacholine chloride (1.0 mg/100 ml) and cholecystokinin-pancreozymin (6.25 Ivy dog U/100 ml) greatly decreased the specific radioactivity of digestive enzymes secreted by the rabbit pancreas *in vitro* when these stimulants were added to the bathing medium 2 hr after ^{14}C-L-leucine had been introduced. Inhibition was approximately 97% for methacholine chloride and 78% for cholecystokinin-pancreozymin. This observation indicates that secreted proteins are derived from 2 parallel intracellular pools, slowly and rapidly equilibrating, and probably consist of zymogen granules and cytoplasm, resp. The secretory stimulants preferentially increased protein secretion from the slow pool. In the unstimulated state secretion from the rapid pool accounted for no less than 18 to 71% of the total protein secreted for individual experiments. A 5-min delay in the response to methacholine chloride was observed. During this delay, secretion from the rapid pool was inhibited relative to secretion from the slow pool, even though overall protein output was unchanged. This suggests that competitive inhibition occurred between secretory proteins derived from the 2 different pools and, at least with cholinergic stimuli, enzymes derived from these 2 pools mix prior to their transport out of the secretory cell.

4245 ACCUMULATION OF AMYLASE BY CHICK PANCREAS IN ORGAN CULTURE: EFFECT OF HYDROCORTISONE. *(E.)* Yalovsky, U.; Heller, H.; Kulka, R. G. (Dept. Biol. Chem. Hebrew Univ., Jerusalem, Israel). *Exp. Cell Res.* 80(2):322-328, 1973.

Accumulation of amylase by pancreas explants from 7-14-day-old chick embryos was studied in organ culture. The explants produced amylase but there was no increase in their total DNA and little if any increase in their total protein. Most of the amylase in the cultures was released into the culture medium. The younger the age at which the pancreas was taken, the greater the relative increase of amylase activity in the culture. After several days of culture, accumulation of amylase slowed or stopped. Hydrocortisone markedly increased the amount of amylase produced by the explants. The hormone had little or no effect on the initial rate of amylase production by the explants. However, addition of hydrocortisone to the culture resulted in a continuing increase of amylase activity when synthesis of the enzyme had ceased in the controls without added hormone. These observations support the hypothesis that corticosteroids are implicated in the later stages of differentiation of the embryonic chick pancreas.

4246 CANINE PANCREATIC RESPONSES TO INTESTINALLY PERFUSED FAT AND PRODUCTS OF FAT DIGESTION. *(E.)* Meyer, J. H.; Jones, R. S. (VA Hosp., San Francisco, Calif.). *Am. J. Physiol.* 226(5):1178-1187, 1974.

In dogs with chronic gastric and pancreatic fistulas, pancreatic outputs were measured in response to intestinally perfused fatty acid soaps, fatty acids dispersed in α-monolein + bile, or triglyceride (corn oil) with or without added active pancreatic juice. All perfusates were at pH 7 or higher and were approximately isotonic to blood. Fatty acids of less than 9 carbons in chain length had no effect on pancreatic secretion while fatty acids longer than 9 carbons stimulated pancreatic secretion in a dose-dependent fashion over concentrations ranging from 5 to 160 mM. Juice stimulated by fatty acids had a higher bicarbonate:protein ratio than could be accounted for solely by the release of endogenous cholecystokinin. Monolein stimulated a juice high in protein but low in bicarbonate. Unlike fatty acid stimulation, stimulation by monolein produced a juice with bicarbonate: protein ratios similar to those obtained by stimulation with cholecystokinin or the octapeptide of cholecystokinin. Large amounts of luminal triglyceride did not stimulate unless the corn oil was converted into products, presumably free fatty acids and monoglycerides, which were capable of stimulating pancreatic secretion.

4247 RELATIVE POTENCIES OF MAGNESIUM (Mg^{++}), CALCIUM (Ca^{++}) AND OLEIC ACID (C_{18}) ON PANCREATIC, GALLBLADDER AND INTESTINAL FUNCTION IN MAN. *(E.)* Malagelada, J. R.; Holtermuller, K. H.; Go, V. L. W. (Mayo Clin., Rochester, Minn.). *Gastroenterology* 66(4):737, 1974.

4248 SYNTHETIC PROSTAGLANDIN ANALOG AND PANCREATIC SECRETION. *(E.)* Rosenberg, V.; Robert, A.; Gonda, M.; Dreiling, D. A.; Rudick, J. (Mt. Sinai Sch. Med., New York, N.Y.). *Gastroenterology* 66(4):767, 1974.

4249 PREGNANCY AND CANINE PANCREATIC EXOCRINE SECRETION. *(E.)* Rosenberg, V.; Rudick, J.; Dreiling, D. A. (Mt. Sinai Sch. Med., New York, N.Y.). *Gastroenterology* 66(4):767, 1974.

4250 PROTEIN SECRETORY RECEPTORS IN RABBIT PANCREAS. *(E.)* Solomon, T.; Solomon, N.; Leis, P.; Shanbour, L. L.; Jacobson, E. D. (Univ. Texas Med. Sch., Houston). *Gastroenterology* 66(4):780, 1974.

4251 INTERPLAY OF VASOACTIVE INTESTINAL PEPTIDE (VIP) AND SYNTHETIC VIP FRAGMENTS WITH SECRETIN AND OCTAPEPTIDE OF CHOLECYSTOKININ (OCTA-CCK) ON PANCREATIC AND BILIARY SECRETION. *(E.)* Makhlouf, G. M.; Said, S. I.; Yau, W. M. (Med. Coll. Virginia, Richmond). *Gastroenterology* 66(4):737, 1974.

4252 ACETYLCHOLINE AND PHOSPHATIDYLINOSITOL METABOLISM IN MOUSE PANCREAS. *(E.)* Hokin-Neaverson, M. (Univ. Wisconsin, Madison). *Fed. Proc.* 33(5):1527, 1974.

4253 ACTION OF A BOVINE PANCREATIC POLYPEPTIDE (BPP) ON PANCREATIC SECRETION IN DOGS. *(E.)* Lin, T. M.; Evans, D. C.; Chance, R. E. (Lilly Res. Lab., Indianapolis, Indiana). *Gastroenterology* 66(4):852, 1974.

4254 INTERRELATIONSHIPS BETWEEN BILE ACIDS (BA) AND FATTY ACID (FA) ABSORPTION REGULATE CCK-PZ RELEASE IN MAN. *(E.)* Malagelada, J. R.; Go, V. L. W.; Dimagno, E. P.; Summerskill, W. H. J. (Mayo Clin., Rochester, Minn.). *J. Clin. Invest.* 53(6):49a, 1974.

See also 4153.

SECRETION AND METABOLISM

Hepatobiliary Tract

4255 STORAGE IRON KINETICS. IV. CELLULAR DISTRIBUTION OF FERRITIN IRON STORES IN RAT LIVER. *(E.)* Cook, J. D.; Hershko, C.; Finch, C. A. (Univ. Washington Sch. Med., Seattle). *Proc. Soc. Exp. Biol. Med.* 145(4):1378-1381, 1974.

A study was undertaken in female Wistar rats to determine the distribution of ferritin iron stores between reticuloendothelial and parenchymal cells of the liver. After selective radioiron labeling of the reticuloendothelial cell ferritin compartment with heat-damaged erythrocytes, the ratio of specific activities of ferritin extracted from whole liver and from isolated Kupffer cells provided a measure of the size of ferritin iron stores within each cellular compartment. These studies suggested that a mean of 14.3% of hepatic ferritin was contained in RE cells. While this figure may be taken as a maximal estimate of RE ferritin, it does not exclude the possibility of significant contamination of the Kupffer cell fraction by parenchymal ferritin. RE cell concentrates obtained with pronase were in fact significantly contaminated. When corrected for this cross-contamination by parenchymal cell ferritin, the RE cell ferritin was calculated to be only 2.6% of the total-liver ferritin, indicating that, in the rat, hepatic ferritin can be equated with parenchymal ferritin stores.

4256 PELIOSIS-LIKE CHANGES INDUCED BY PHALLOIDIN IN THE RAT LIVER. A LIGHT AND ELECTRON MICROSCOPIC STUDY. *(E.)* Tuchweber, B.; Kovacs, K.; Khandekar, J. D.; Garg, B. D. (Inst. Surg. Exp. Med., Univ. of Montreal, Canada). *J. Med. (Basel)* 4(6):327-345, 1973.

Administration of phalloidin (0.3 mg/100 mg i.p.) to ARS/Sprague-Dawley rats produced lesions resembling peliosis hepatitis in man and animals. Under the electron microscope, the first change observed in the hepatocytes is the formation of cytoplasmic vacuoles resulting from invagination of the cytoplasmic membranes. At the same time, microvilli along Disse's spaces virtually disappear. Later, the cytoplasmic membranes display focal interruptions, and RBC are seen in the greatly dilated sinusoids and in the cytoplasmic vacuoles. The pathogenesis of phalloidin-induced liver lesions is not clear. Early hepatic changes resemble those seen after ischemia; hence, microcirculatory disturbances may play a role in the production of this liver injury.

4257 AUGMENTATION OF THE CLEARANCE OF SULFOBROMOPHTHALEIN BY PHENOTHIAZINES. *(Fr.)* Denis, Ph.; Le Leannec, A.-M.; Benhamou, J.-P. (Beaujon Hosp., Clichy, France). *Nouv. Presse Med.* 2(43):2881-2883, 1973.

The BSP clearance was investigated in 30 psychiatric patients who had been taking large doses of phenothiazines (thioridazine, methotrimeprazine, fluphenazine, pericyazine) for 2 months or more to determine whether phenothiazines increase BSP clearance in man as they do in the rat. Controls consisted of 11 psychiatric patients receiving no medication. The first-order rate constant (K_1) for plasma decay of BSP was measured 4 and 16 min after i.v. injection of the dye. K_1 was significantly higher (mean of 0.175 ± 0.042/min) in treated than in untreated patients (mean of 0.130 ± 0.016/min). In 13 of the 30

eated patients, K$_1$ was above the upper limit of
e normal range. Elevated K$_1$ values in patients
king phenothiazine derivatives are probably due to
creases in hepatic extraction of the dye.

58 PRODUCTION OF SERUM PROTEINS BY PRIMARY
CULTURES OF ADULT HUMAN LIVER. *(E.)* Le
illy, Y.; Launois, B.; Lenoir, P.; Bourel, M.
ontchaillou Hosp., Rennes, Fr.). *Biomedicine*
(3):248-255, 1973.

corporation of ^{14}C(U)-L-isoleucine and ^{14}C(U)-L-
sine into orosomucoid, α_1-antitrypsin, ceruloplas-
n, fibrinogen, transferrin, hemopexin, albumin,
-lipoprotein, α_2-macroglobulin, and haptoglobin
s investigated in 15 primary cultures from explants
human adult liver. Radioimmunoelectrophoresis
evealed that these 10 plasma proteins were present
all 15 of the primary liver cultures but were
ever present simultaneously in the medium of a
ingle primary culture. The findings suggest that
rosomucoid, α_1-antitrypsin, ceruloplasmin, and fibri-
ogen are products of epithelial cells (types III
d IV), while transferrin and hemopexin are synthe-
ized by type V cells which are morphologically in-
ermediate between fibroblasts (type I) and epithe-
ial cells (type IV). The 4 remaining proteins were
ound in all cultures independent of their dominant
ell type.

259 TRIGLYCERIDE LEVELS AND OXYGEN CONSUMPTION
OF LIVER, KIDNEY AND HEART FOLLOWING A HIGH
AT CHOLINE FREE DIET IN RATS. *(E.)* Agostini, C.;
ngelotti, A. (Inst. Gen. Pathol., Univ. Milan, I-
aly). *Pathol. Eur.* 8(2):105-111, 1973.

he triglyceride contents of liver, kidney, and
eart were measured in female Wistar rats fed for 3,
and 12 days on choline-free diet containing 31%
otal lipids, 15% total protein, and 48% total car-
ohydrates. Controls were fed a diet containing
5% total protein, 5% total lipids, and 59% total
arbohydrate. The effect of refeeding the rats on a
ormal diet for 6 days was also observed. The oxy-
en consumption by slices of the same organs in the
resence and in the absence of butyrate was investi-
ated. Triglyceride levels progressively increased
n liver and kidney during feeding with the high-fat,
holine-free diet. Refeeding the rats a normal diet
trongly reduced the accumulation of triglycerides
n these organs. Triglyceride levels were higher
n hearts of rats fed the high fat, choline free
iet for 3 days, but no further increase occurred
hen the period on this diet was lengthened. Re-
feeding the rats a normal diet did not modify lipid
accumulation. The presence of butyrate did not modify the oxygen consumption of liver and kidney slices of normal rats. Oxygen consumption was not statistically modified by feeding the rats the high-fat, choline-free diet, but on the 12th day, these organs showed a significant increase in the oxygen uptake in the presence of butyrate. Butyrate also increased the oxygen uptake by heart slices of normal rats. The hearts of those on the 12-day diet showed an increase in oxygen uptake which was not further stimulated by the presence of butyrate.

4260 EFFECT OF DIETARY METHIONINE AND CHOLESTEROL ON LIPID METABOLISM OF RATS. *(E.)* Miller, J. (Univ. Georgia Coll. Agr. Exp. Stations, Georgia Station). *Nutr. Rep. International* 9(2): 125-134, 1974.

Addition of 1% cholesterol to diets containing 14.3% casein and 5% Wesson oil caused hepatomegaly, due primarily to increased deposition of neutral lipids, especially cholesterol esters and triglycerides, in the livers of weanling male Sprague-Dawley rats. Increases which occurred in free fatty acids were caused by major increases in oleic, linoleic, palmitic, and palmitoleic acids. While the first 3 of these acids together constituted about 90% of the dietary fatty acids and the diet contained only 0.3% of palmitoleic acid, this acid accounted for more than 18% of the increase in total fatty acids in the livers of rats fed diets containing cholesterol. A concomitant reduction occurred in the fatty acid content of adipose tissue and the aorta. Dietary supplementation with 1% methionine decreased the deposition of cholesterol in livers of animals fed the high-cholesterol diets. It is postulated that accumulation of cholesterol in the liver interfered with hepatic lipid metabolism and transfer of lipids to extra-hepatic tissues.

4261 CANALICULAR BILE FLOW AND BROMOSULFOPHTHALEIN TRANSPORT MAXIMUM: THE EFFECT OF A BILE SALT-INDEPENDENT CHOLERETIC, SC-2644. *(E.)* Gibson, G. E.; Forker, E. L. (Dept. Physiol., Univ. Iowa, Iowa City). *Gastroenterology* 66(5):1046-1053, 1974.

Cannulae were placed in the common bile duct, a femoral vein, and the contralateral femoral artery of female mongrel dogs. The secretory response to infusions of taurocholate (1.5, 2.0, or 3.0 μmoles/min/kg), β-(2,4-diamethoxy-5-cyclohexylbenzoyl)-propionic acid (0.5 μmoles/min/kg), of dehydrocholate (1.9 μmoles/min/kg) was determined. Both taurocholate and β-(2,4-diamethoxy-5-cyclohexylgenzoyl)-propionic acid produced increases in bile flow and equivalent increases in the biliary clearance of erythritol. Only taurocholate increased BSP transport maximum and increased the fraction of unconjugated dye appearing in bile. It was therefore concluded that the taurocholate-dependent changes in BSP excretion were not attributable to the associated choleresis, but instead represented a specific effect of the bile acid. It could not be determined whether an effect of taurocholate on the membrane transport of BSP or micellar sequestration of dye in the canalicular lumen was the more important mechanism. However, indirect evidence does suggest that alterations in the intracellular conjugation of BSP does not account for the bile acid-dependent changes in BSP transport maximum.

4262 REGULATION OF BILE FORMATION IN RABBITS AND GUINEA PIGS. *(E.)* Shaw, H. M.; Heath, T. J. (Sch. Physiol. Pharmacol., Univ. New South Wales, Kensington, Australia). *Q. J. Exp. Physiol.* 59(2):93-102, 1974.

Saline infusion to compensate for bile loss of water and electrolytes due to interrupted enterohepatic circulation of bile salts, enabled bile flow in conscious rabbits and guinea pigs to remain constant for several hours. This indicates that bile flow in these species is not as highly dependent on bile salt secretion as it is in dogs and man. Secretin (0.3, 3.0, 30 and 300 mu/min/kg), cholecystokinin-pancreozymin (0.036, 0.36, 0.9, 1.8, and 3.6 u/min/kg) and pentagastrin (0.45, 0.9, 4.5, and 9.0 ug/min/kg) were ineffective as choleretics in rabbits although the doses of these exogeneously-administered hormones were sufficient to significantly increase either pancreatic or gastric secretion. After the administration of secretin and cholecystokinin-pancreozymin to guinea pigs, trivial choleretic responses were noted. Attempts to elicit a choleresis by release of endogenous hormones again caused no changes in bile formation although pancreatic secretion was stimulated in rabbits. Peptone infusion was not effective in stimulating the release of endogenous cholecystokinin-pancreozymin. These results suggest that factors influencing bile formation in rabbits and guinea pigs differ from those in other species. This difference is related to the eating habits of the different species. In carnivores, food is taken intermittently, and thus delivery of bile to the duodenum is intermittent and peaks in bile output are induced by the release of gastrointestinal hormones. In herbivores, however, food probably enters the intestine more or less continuously, bile is formed at a constant high rate and these hormones are less likely to have an essential role in bile formation.

4263 TURNOVER OF HEPATIC CYTOCHROME P-450 IN EXPERIMENTAL CHOLESTASIS. *(E.)*

Denk, H.; Greim, H.; Hutterer, F.; Schanffner, F.; Popper, H. (Mt. Sinai Sch. Med., New York, N.Y.). *Exp. Mol. Pathol.* 19(2):241-247, 1973.

Hypertrophy of smooth microsomal membranes was observed in mole Sprague-Dawley rats after bile duct ligation. In contrast to typical induction, the membranes were deficient in cytochrome P-450. The total cytochrome P-450 content of the liver homogenate, however, remained unchanged. To clarify the mechanism of the developement of cytochrome P-450-deficient membranes in cholestasis, the half life of the heme portion of cytochrome P-450 and the initial rate of synthesis of cytochrome P-450 and b_5 hemes were compared in bile duct ligated rats and in control animals after labeling the heme by injection of the precursor, δ-(4-^{14}C)aminolevulinic acid. The half lives were not significantly different, which eliminates the possibility that selective destruction of cytochrome P-450 had occurred. Depression of cytochromal heme synthesis was not observed. The relative cytochrome P-450 deficiency during mechanical cholestasis is probably caused by proliferation of components of the endoplasmic reticulum other than the hemoprotein.

4264 BILIRUBIN AND BILIVERDIN EXCRETION BY THE CHICKEN. *(E.)*

Lin, G. L.; Himes, J. A.; Cornelius, C. E. (Coll. Vet. Med., Univ. Florida, Gainesville). *Am. J. Physiol.* 226(4): 881-885, 1974.

The mean endogenous bile flow measured in 29 chickens was 20.1 μl/kg/min. Endogenous biliverdin and bilirubin excretory rates were 14.7 and 0.9 μg/kg/min, resp. Excretory rates for total endogenous bile pigments were greater than in other species, with bilirubin rates accounting for only 6% of the total bile pigments. Biliverdin was more readily excreted into bile than bilirubin during i.v. infusions of mixtures. Mean excretory and biliary concentration maxima for biliverdin were 94 μg/kg/min and 888 mg/100 ml, resp. Bilirubin infusion trials revealed the transport maxima and concentration maxima for bilirubin in bile were much lower in the chicken than in other species, 10.2 μg/kg/min and 72 mg/100 ml, resp. The limited capacity of the avian liver to excrete bilirubin may relate in part to the existence of very low levels of bilirubin glucuronyl transferase activity in the avian liver. Infusions of unconjugated bilirubin had no effect on endogenous biliverdin excretion, suggesting that the presence of biliverdin in chicken bile is most likely not due to posthepatic oxidation of bilirubin. There appeared to be little if any net conversion of infused biliverdin to bilirubin. Thus the chicken represents a unique model for the study of bile pigment excretion. With little hepatic bilirubin glucuronyl transferase activity and little or no biliverdin reductase activity in the tissues, direct excretion of biliverdin into bile is the major pathway for the elimination of bile pigments.

4265 PROTECTIVE EFFECT OF ZINC ON CARBON TETTRACHLORIDE-INDUCED LIVER INJURY IN RATS. *(E.)*

Chvapil, M.; Ryan, J. N.; Elias, S. L.; Peng, Y. M. (Coll. Med., Univ. Arizona, Tucson). *Exp. Mol. Pathol.* 19(2):186-196, 1973.

In rats treated twice weekly for 20 or 34 days with CCl_4(0.2 ml/100 g, i.p.), a significant increase occurred in the content of malonaldehyde in microsomal and mitochondrial fractions of the liver. The rise in this indirect index of lipid peroxidation correlated with labilization of lysosomes, as evidenced by an increase in free β-glucuronidase present in the 15,000*g* supernatant of the liver homogenate. At the same time, the amount and the synthesis of collagen was significantly elevated. After zinc acetate administration (5 mg/100 g/day p.o. through a stomach tube) to rats receiving CCl_4, the content of malonaldehyde in the microsomal, as well as the mitochondrial fraction of the liver, was significantly lower. This correlated with a decrease in free β-glucuronidase and a decrease in the amount and in the rate of biosynthesis of collagen. Administration of zinc to normal rats had no effect on the amount and synthesis of collagen in the liver. The free and total activity of lysosomal β-glucuronidase in the liver was also unaltered by zinc in normal animals. The level of malonaldehyde was inhibited only in the microsomal fraction. In rats kept on a diet high in zinc (100 ppm), the content of endogenously-, as well as exogenously-induced

alonaldehyde in the liver was lower. It is be-
ieved that zinc protects the liver against the
oxious effect of CCl_4 primarily by interference with
ipid-peroxidation-related tissue damage.

266 D-GALACTOSAMINE HEPATOTOXICITY. III. NORMOACTIVE SMOOTH ENDOPLASMIC RETICULUM AND MODIFICATION BY PHENOBARBITAL. *(E.)*
off, R. S.; Davidson, L. J.; Gordon, G.; Sabesin, S.
. (Boston VA Hosp., Mass.). *Exp. Mol. Pathol.* 19(2):
68-177, 1973.

he administration of a single dose of D-galacto-
amine HCl (375 mg/kg i.p.) to female rats produces
evere hepatocellular necrosis. Ultrastructural
tudies disclosed a variety of nuclear and cytoplas-
ic changes including focal and diffuse hyperplasia
f the smooth endoplasmic reticulum. The functional
apacity of the hyperplastic smooth endoplasmic
eticulum was investigated by several criteria.
entobarbital sleeping time determined 6, 16, and 24
r after D-galactosamine injection was similar to
hat observed in saline-treated control animals.
epatic microsomal protein concentration, cytochrome
-450 content, and NADPH cytochrome c-reductase
ctivity measured at 20 hr were similar in D-galact-
samine-treated and control animals. Thus, using
hese modalities, the hyperplastic smooth endoplasmic
eticulum induced by D-galactosamine was not associ-
ted with an altered microsomal drug metabolizing
ctivity. When phenobarbital was administered in
daily dose of 80 mg/kg for 4 days prior to
-galactosamine, the histological evidence of
epatocellular injury and lipid accumulation was
ess severe than in animals receiving D-galactosamine
lone. The mechanisms of the modification of
epatotoxicity and fatty liver by phenobarbital
emain to be determined.

267 METABOLIC ACTIVITY AND RADIO-REACTION OF THE ISOLATED PERFUSED RAT LIVER.
Ger.) Konig, K.; Stahler, F.; Ungemach, R.
Inst. Biophysics Radiation Biol., Univ. Hamburg,
ermany). *Stralentherapie* 146(4):478-489, 1973.

he protein metabolism of the liver of rats was
timulated by deproteinization of the blood plasma
ith exchange transfusion. With isolated organ
erfusion, the reaction of the liver was tested
ithout the influences of the total organism.
y variation of the time intervals between de-
roteinization and 3-hr perfusion with ^{3}H-leucine,
aximum stimulation of albumin occurred 6-12 hr
fter deproteinization, while maximum stimulation
f globulin occurred 24 hr after deproteinization.
he highest net protein synthesis was found 24 hr
fter deproteinization. The effect of irradiation
as investigated during a 3-hr perfusion 24 hr
fter deproteinization. After irradiation with
00 r, the induction of additional synthesis of
lasma proteins was almost completely suppressed.
he lack of cellular activity disclosed damage
aused by irradiation and intensified the degree
f radio-reaction.

4268 INDUCED ALTERATIONS IN THE RATE-LIMITING ENZYMES OF HEPATIC CHOLESTEROL AND BILE ACID SYNTHESIS IN THE HAMSTER. *(E.)* Schoenfield, L. J.; Bonorris, G G.; Ganz, P. (Cedars Sinai Med. Ctr., Los Angeles, Calif.). *J. Lab. Clin. Med.* 82(6): 858-868, 1974.

The effects of bile acids and of certain potential cholelithiasis therapeutic agents, i.e. cholestyramine and phenobarbital, on the rate-limiting hepatic enzymes of cholesterol synthesis (β-hydroxyl-β-methylglutaryl coenzyme A reductase) and of bile acid synthesis (7-α-hydroxylase) were determined in hamsters. Cholic and chenodeoxycholic acids were administered intragastrically in a 16% solution of ethanol (43 mg/kg/day). Cholestyramine was added to the diet (5% by weight). Phenobarbital was given i.p. (5 mg/kg/day). The duration of treatment was 2 weeks. After sacrifice of the animals, portions of liver were taken for measurements of enzyme activity and of cholesterol and bile acid content. Administration of cholic or chenodeoxycholic acid inhibited β-hydroxyl-β-methylglutaryl coenzyme A reductase, as revealed by decreased *in vitro* cholesterol synthesis, and 7-α-hydroxylase, as revealed by decreased *in vitro* bile acid synthesis. At the same time, administration of these compounds resulted in increased concentrations of cholesterol and bile acids in the liver. Chenodeoxycholic acid inhibited cholesterol synthesis (61%) more than it inhibited bile acid synthesis (49%), whereas cholic acid inhibited bile acid synthesis (32%) more than it inhibited cholesterol synthesis (26%). In contrast, cholestyramine caused stimulation of cholesterol synthesis (253%) and an even more pronounced increase in bile acid synthesis (464%), while hepatic cholesterol and total bile acid content did not change and deoxycholic acid virtually disappeared. Phenobarbital similarly induced stimulation of cholesterol synthesis (151%) and bile acid synthesis (176%) while with this agent the hepatic concentrations of cholesterol and bile acids increased.

4269 BILIRUBIN: A POTENT INHIBITOR OF NAD^+-LINKED ISOCITRATE DEHYDROGENASE. *(E.)* Ogasawara, N.; Watanabe, T.; Goto, H. (Dept. Biochem., Inst. Develop. Res., Kasugai, Japan). *Biochim. Biophys. Acta* 327(2):233-237,1973.

Bilirubin (3.5 μM) was found to be an effective inhibitor of NAD^+-linked rat brain isocitrate dehydrogenase in Tris HCl buffer at pH 7.5. In the absence of ADP, the dehydrogenase showed a cooperative effect toward isocitrate, and the saturation curve was slightly sigmoidal whereby an apparent K_m of 5 mM was obtained. In the presence of ADP (1.33 mM), the apparent affinity of the enzyme for isocitrate increased, and the kinetics shifted to near hyperbolic and an apparent K_m of 0.7 mM. Bilirubin affected only the apparent affinity of the enzyme for isocitrate and the V was unaffected by this modifier. Thus, bilirubin inhibits the NAD^+-linked isocitrate dehydrogenase at the lower isocitrate concentrations and the inhibition is overcome with increasing concentration of isocitrate. The overall result is a shifting of the activity curve to the right with bilirubin and a corresponding increase in the sigmoidicity of the curve. Bilirubin concentrations as low as 0.35 μM produced detectable inhibition. It was suggested that bilirubin either competes for the isocitrate binding site or occupies a separate allosteric site. Neither the mitochondrial nor the cytoplasmic NADP$^+$ enzymes were significantly affected with up to 6 μM of bilirubin. Although the significance *in vivo* of the bilirubin inhibition of NAD$^+$-linked isocitrate dehydrogenase is not known, the very low concentration of bilirubin necessary to alter the activity *in vitro* suggests that the phenomenon could be significant in the pathogenesis of bilirubin encephalopathy.

4270 EFFECT OF ETHANOL ON LIVER TRIGLYCERIDE CONCENTRATION IN FED AND FASTED RATS. *(E.)* Johnson, O. (Dept. Chem., Univ. Umea, Sweden). *Lipids* 9(1):57-60, 1973.

The effect of ethanol, given p.o. through a stomach tube (6 g/kg) or by i.p. injection (3.75 g/kg), on the liver triglyceride concentration was studied in female Sprague-Dawley rats which were fasted or fed *ad libitum*. Independent of the route of administration, ethanol increased the liver triglyceride concentration in fasted rats during an 8 hr period but caused a much smaller increase in the *ad libitum* fed rats. The incorporation of i.v. injected ^{3}H-oleic acid into the liver triglycerides increased significantly after ethanol feeding in fasted but not in fed rats. Based upon this and the plasma free fatty acid concentrations, it was concluded that ethanol causes a marked increase in the utilization of plasma free fatty acids for synthesis of liver triglycerides in fasted but not in fed rats.

4271 SYNERGISM BETWEEN MERCAPTANS AND AMMONIA OR FATTY ACIDS IN THE PRODUCTION OF COMA: A POSSIBLE ROLE FOR MERCAPTANS IN THE PATHOGENESIS OF HEPATIC COMA. *(E.)* Zieve, L.; Doizaki, W. M.; Zieve, F. J. (Minneapolis Veterans Hosp., Minn.). *J. Lab. Clin. Med.* 83(1):16-28, 1974.

The coma-producing properties of methanethiol, ethanethiol, and dimethylsulfide were studied in male Holtzman or Sprague-Dawley rats. Coma occurred in 50% of the rats when the air they breathed contained 0.16% methanethiol, 3.3% ethanethiol, or 9.6% dimethylsulfide by volume. The blood concentrations at which coma occurred were 0.5 nm/ml methanethiol, 200 nm/ml ethanethiol, and 7000 nm/ml dimethylsulfide. The doses of ammonium ion or octanoate at which rats went into coma were greatly reduced when subcoma doses of mercaptans were simultaneously administered. The addition of small subcoma doses of methanethiol to subcoma doses of ammonium ion caused coma in all animals and a substantial rise in blood ammonia, suggesting that the mercaptan interferes with conversion of ammonia to urea in the liver. Conversely, the addition of small subcoma doses of ammonium ion or of fatty acid to a small subcoma dose of methanethiol caused coma in all animals and a marked rise in the blood methanethiol concentration, suggesting that the ammonium ion interferes with breakdown of methanethiol by the liver. Normal rats became comatose when blood or plasma levels of methanethiol, ammonia, and free fatty acids reached levels found in hepatic coma following acute massive necrosis of the liver. Thus it is concluded that the synergistic action of these 3 toxic substances accounts for the coma of experimental heaptic necrosis. It is suggested that methanethiol may play a role as an augmenter or intensifier of the toxic effects of ammonia and fatty acids in human hepatic failure.

4272 INCREASE IN HEPATIC NAD LEVEL ITS EFFECT ON THE REDOX STATE AND ON ETHANOL AND ACETALDEHYDE METABOLISM. *(E.)* Eriksson, C. J. P. (Res. Lab., State Alcohol Monopoly, Helsinki, Finland). *FEBS Lett.* 40(2):317-320, 1974.

A group of male Wistar rats received nicotinamide (5.0 mg/kg. i.p.) while a second group served as controls. Ethanol was given to both groups (1.18 g/kg, i.p.) 8 hr later. Ethanol decreased total hepatic nictinamide adenine dinucleotide (NAD) with a consequent rise in reduced NAD (NADH) in all rats. In rats receiving nicotinamide, a 5-fold increase in total liver NAD was noted on receipt of the ethanol, but no change occurred in NADH. These results could mean either that NAD accumulated in some form in a compartment other than the cytosol, or that the increased NAD liberated bound NADH in the cytosol. This would keep the ratio between the free nucleotides unchanged. The rate of ethanol oxidation in the liver cytosol can be modified primarily by the enzyme activity, acetaldehyde/ethanol ratio, and free NADH/free NAD ratio in this cell compartment. Increasing hepatic NAD with nicotinamide had no effect on ethanol elimination. Thus, NAD deficiency does not limit ethanol oxidation. Assuming that the cell compartment where acetaldehyde is oxidized is supplied with some of the increased NAD, then the lowered acetaldehyde level in the liver and blood of rats treated with nicotinamide suggests that NAD deficiency is one factor limiting the rate of hepatic acetaldehyde oxidation. Alternatively, instead of a difference in the rate of acetaldehyde oxidation, the lower acetaldehyde levels in the nicotinamide-treated rats could be due to the slightly decreased ethanol oxidation rate which was found in these animals.

4273 SELECTIVE BILIARY OBSTRUCTION: A MODEL FOR THE STUDY OF LIPID METABOLISM IN CHOLESTASIS. *(E.)* Cooper, A. D.; Jones, A. L.; Koldinger, R. E.; Ockner, R. K. (Univ. Calif. Med. Sch., San Francisco). *Gastroenterology* 66(4):574-585, 1974.

nodel of cholestasis has been developed in
e rat in which bile duct obstructed and un-
structed liver tissue from the same animal
n be compared. The model involves selective
struction of bile ducts draining the median
patic lobe in male Sprague-Dawley rats.
ght microscopic changes consistent with
olestasis were found in the obstructed
dian lobe, but not in the unobstructed
ght lobe. Electron microscope examination
vealed osmiophilic material in the canaliculi
the obstructed side, while on the unobstructed
de the prominent Golgi apparatus, moderately
lated canaliculi, and intact microvilli
ggest increased bile secretory activity.
ncentrations of total and free cholesterol
d of phospholipids were similar in the
ssues of unobstructed and obstructed hepatic
bes. Levels of serum cholesterol, phospholipids,
d alkaline phosphatase were significantly
evated. An abnormal lipoprotein, characteristic
biliary obstruction, also appeared. It is
ggested that these differences between complete
d selective obstruction are due at least in
rt to the presence of functioning, i.e.,
le-secreting, liver tissue in the latter
rcumstance. The morphological changes observed
total obstruction may depend on the accumulation
the hepatocyte of substances which are normally
creted, e.g., bile salts. It is felt that the
thod of selective biliary obstruction may be
ed as an experimental approach to further
ucidate the abnormalities in lipid and lipo-
otein metabolism associated with cholestasis,
d the process of bile secretion in general.

74 PRIMATE BILIARY PHYSIOLOGY. IX. EFFECTS
OF ACUTE BILIARY OBSTRUCTION ON BILIARY
PID METABOLISM IN THE MONKEY. *(E.)* Redinger,
N.; Strasberg, S. M.; Small, D. M. (Boston
iv. Sch. Med., Mass.). *Am. J. Physiol.*
6(4):776-783, 1974.

alth well-fed rhesus monkeys with exteriorized
terohepatic circulations were subjected to
ort periods of biliary obstruction by clamping
eir bile T-tubes. Pre- and postobstruction
tes of bile acid synthesis were determined by
e marker-dilution technique after the bile
lt pool was labeled with 14_C- acid and/or the
condary bile salt, deoxycholic acid. After
clamping the T-tube, the bile salt pool was
llected by total biliary diversion until
e marker was completely retrieved or the
terohepatic circulation reestablished, and
e biliary lipid secretion rates and relative
ncentrations were determined. Individual
inary and serum bile salts were also followed
roughout the experiment. Bile acid synthesis
s suppressed in animals obstructed for more
an 6 hr; it remained inhibited for up to 10
after the relief of obstruction. During
struction, most of the bile salt pool was
tained in the liver. In monkeys with reestablished
terohepatic circulation following obstruction,
le salt secretion rates remained suppressed,
ile those of phospholipid and cholesterol were
enhanced. Thus, bile with a decreased cholesterol-holding capacity was secreted for several days after the relief of obstruction.

4275 STUDIES OF HEPATIC CHOLESTEROL SYNTHESIS IN EXPERIMENTAL ACUTE BILIARY OBSTRUCTION. *(E.)* Cooper, A. D.; Ockner, R. K. (Univ. California Sch. Med., San Francisco). *Gastroenterology* 66(4): 586-595, 1974.

Hepatic cholesterol synthesis and response to feedback inhibition was studied in rats 48-hr after selective or complete biliary obstruction. After selective obstruction of the median hepatic lobe, cholesterol synthesis in slices from the obstructed lobe, as measured by incorporation of ^{14}C-acetate, was similar to that after complete biliary obstruction and was 34% greater than that in the unobstructed right lobe. With homogenates, using both ^{14}C-acetate and $^{3}H_2O$ as precursors, synthesis in the obstructed lobe was 90% greater than that in the unobstructed lobe. No significant differences were noted in incorporation of ^{14}C-acetate into $^{14}CO_2$, in tissue cholesterol concentrations, or in uptake of lipoprotein ^{14}C-cholesterol by the lobes. It was suggested that the biliary obstruction interfered with the cholesterol feedback inhibitory mechanism. This interpretation was supported by the additional finding that whereas a 48-hr i.v. infusion of normal quantities of lymph lipoprotein cholesterol almost completely blocked the expected rise in synthetic rate in bile fistula rats, this same infusion had essentially no effect on the increased hepatic cholesterol synthetic rats in animals with complete biliary obstruction. Furthermore, although a 48-hr i.v. infusion of twice normal amounts of lipoprotein cholesterol suppressed synthesis in both lobes of selectively obstructed rats, it did not abolish the relative difference between them. In triparanol-treated rats, complete biliary obstruction caused a greater increase in blood desmosterol than in controls, both absolutely and relative to blood cholesterol. These studies indicate that in acute biliary obstruction, increased precursor incorporation *in vitro* is associated with accelerated net synthesis of cholesterol *in vivo*, and reflects an abnormality in the control of hepatic cholesterol synthesis.

4276 RESTORATION OF ENERGY-LINKED FUNCTIONS IN "AGING" RAT-LIVER MITOCHONDRIA. *(E.)* Ozelkök, S. I.; Romani, R. J. (Dept. Pomol., Univ. California, Davis). *Life Sci.* 14(8):1427-1431, 1974.

4277 CHANGES OF PEROXISOMES IN THE REGENERATING HEPATIC PARENCHYMAL CELLS IN THE RAT. *(E.)* Saito, T.; Iwata, K.; Ogawa, K. (Inst. Developmental Res., Aichi, Japan). *Acta Histochem. Cytochem.* 6(3):212-229, 1973.

4278 INFLUENCE OF LIVER-RES ON TOXIC LIVER DAMAGE DUE TO GALACTOSAMINE. *(E.)* Grun, M.; Liehr, H.; Grun, W.; Rasenack, U.; Brunswig,

D. (Dept. Intern. Med., Univ. Wurzburg, Germany). *Acta Hepatogastroenterol.* 21(1):5-15, 1974.

4279 ENZYME ACTIVITIES IN THE REGENERATING RAT LIVER AFTER 66% HEPATECTOMY WITH SPECIAL REFERENCE TO GLUCONEOGENESIS. *(E.)* Haug, H.; Schaum, W.; Strik, W.; Roweck, H. (Dept. Intern. Med., Julius Maximilians Univ. Wurzburg, Germany). *Acta Hepatogastroenterol.* 20(6):467-483, 1973.

4280 HEPATIC AND MESENTERIC METABOLISM OF C-TERMINAL PENTAPEPTIDE OF GASTRIN IN THE RAT. PART I. BILIARY EXCRETION OF LABELED GLYCINEPENTAPEPTIDE. *(E.)* Varro, V.; Varga, L.; Csernay, L.; Nafradi, J.; Penke, B.; Balaspiri, L. (Univ. Med. Sch., Szeged, Hungary). *Acta Hepatogastroenterol.* 20(6):500-505, 1973.

4281 THE EFFECT OF DIETHYLDITHIOCARBAMATE ON BILIARY TRANSPORT, EXCRETION AND ORGAN DISTRIBUTION OF MERCURY IN THE RAT AFTER EXPOSURE TO METHYL MERCURIC CHLORIDE. *(E.)* Norseth, T. (Inst. Occupational Health, Oslo, Norway). *Acta Pharmacol. Toxicol.* 34:76-87, 1974.

4282 CONVERSION OF DIGLYCERIDE TO TRIGLYCERIDE BY RAT LIVER MICROSOMES: A REQUIREMENT FOR THE 105,000 x g SUPERNATANT. *(E.)* Manely, E. R.; Skrdlant, H. B.; Hansbury, E.; Scallen, T. J. (Dept. Chem., Univ. New Mexico, Albuquerque). *Biochem. Biophys. Res. Commun.* 58(1):229-235, 1974.

4283 INHIBITORS OF GLUCAGON INACTIVATION. EFFECT ON GLUCAGON-RECEPTOR INTERACTIONS AND GLUCAGON-STIMULATED ADENYLATE CYCLASE ACTIVITY IN LIVER CELL MEMBRANES. *(E.)* Desbuquois, B.; Krug, F.; Cuatrecasas, P. (Johns Hopkins Univ. Sch. Med., Baltimore, Md.). *Biochim. Biophys. Acta* 343(1):101-120, 1974.

4284 REGULATION OF FRUCTOSE METABOLISM IN THE PERFUSED RAT LIVER. INTERRELATION WITH INORGANIC PHOSPHATE, GLUCOSE, KETONE BODY AND ETHANOL METABOLISM. *(E.)* Sestoft, L. (Dept. Biochem., Univ. Copenhagen, Denmark). *Biochim. Biophys. Acta* 343(1):1-16, 1974.

4285 EFFECT OF BENZIODARONE ON THE BILIARY EXCRETION OF BROMOSULFOPHTHALEIN AND IODIPAMIDE. *(E.)* Van Cantfort, J.; Heusghem, C. (Dept. Med. Chem., Univ. Liege, Belgium). *Biochem. Pharmacol.* 22(23): 3120-3122, 1973.

4286 INCORPORATION OF SATURATED AND POLYUNSATURATED FATTY ACIDS INTO HEPATIC CHOLESTEROL AND BILE ACIDS. *(It.)* Tria, E.; Trentalance, A.; Leoni, S. (Inst. Gen. Physiol., Univ. Rome, Italy). *Boll. Soc. Ital. Biol. Sper.* 49(10): 539-544, 1973.

4287 CHARACTERIZATION AND SUBCELLULAR LOCALIZATION OF LIPASE ACTIVITIES IN RAT LIVER CELL. COMPARISON WITH PHOSPHOLIPASE A. *(E.)* Colbeau, A.; Cuault, F.; Vignais, P. M. (Sci. Med. Univ., Grenoble, France). *Biochimie* 56(2):275-288, 1974.

4288 THE CALCIUM AND MAGNESIUM CONTENT OF MITOCHONDRIA IN NORMAL AND REGENERATING RAT LIVER. *(It.)* Leoni, S.; Mangiantini, M. T.; Spagnuolo, S. (Inst. Gen. Physiol., Univ. Rome, Italy). *Boll. Soc. Ital. Biol. Sper.* 49(10):545-549, 1973.

4289 STUDIES ON THE BILIARY EXCRETION MECHANISMS OF DRUGS. III. ACTIVE TRANSPORT OF GLUCURONIDES INTO BILE IN RATS. *(E.)* Uesugi, T.; Ikeda, M.; Kanei, Y. (Meiji Coll. Pharm., Tokyo, Japan). *Chem. Pharm. Bull.* 22(2):433-438, 1974.

4290 ISOZYMES OF ASPARTATE AMINOTRANSFERASE IN RAT LIVER DURING ACUTE URAEMIA. *(E.)* Maier, K. P.; Herz, E.; Herz, G.; Hoppe Seyler, G.; Talke, H.; Frohlich, J.; Schollmeyer, P.; Gerok, W. (Dept. Internal Med., Univ. Freiburg, Germany). *Eur. J. Clin. Invest.* 4(1):25-28, 1974.

4291 INTERACTION BETWEEN HORMONES AND CYCLIC AMP IN REGULATING SPECIFIC HEPATIC ENZYME SYNTHESIS. *(E.)* Wicks, W. D.; Barnett, C. A.; McKibbin, J. B. (Univ. Colorado Med. Ctr., Denver). *Fed. Proc.* 33(4):1105-1111, 1974.

4292 A POSSIBLE ROLE OF THE GLYCEROL PHOSPHATE CYCLE IN CYCLIC AMP-STIMULATED GLUCONEOGENESIS FROM LACTATE IN PERFUSED RAT LIVERS. *(E.)* Mullhofer, G.; Loy, E.; Wollenberg, P.; Kramer, R. (Inst. Physiol. Chem., Univ. Munich, Germany). *Hoppe Seylers Z. Physiol. Chem.* 355(3):239-254, 1974.

4293 GLYCOGEN METABOLISM IN ISOLATED PERFUSED RAT LIVER. *(E.)* Walli, A. K.; Siebler, G.; Zepf, E.; Schimassek, H. (Inst. Biochem., Univ. Heidelberg, Germany). *Hoppe Seylers Z. Physiol. Chem.* 355(3):353-362, 1974.

4294 SYNTHESES WITH STABLE ISOTOPES: SYNTHESIS OF DEUTERIUM ^{13}C LABELED BILE ACIDS. *(E.)* Hechey, D. L.; Szczepanik, P. A.; Berngruber, O. W.; Klein, P. D. (Div. Biol. Med. Res., Argonne Natl. Lab., Ill.). *J. Labelled Compounds* 9(4): 703-719, 1974.

4295 EXPERIMENTAL STUDY OF THE EFFECTS OF CHOLESTASIS OBTAINED BY GRADUAL STENOSIS OF THE TERMINAL COMMON BILE DUCT. I. LITHOGENIC AND ULCEROGENIC EFFECTS. *(It.)* Torre, G. C.; Mattioli, F. (Inst. Clin. Gen. Surg. Surg. Ther., Univ. Genoa, Italy). *Minerva Med.* 65(10):551-552, 1974.

296 STUDIES ON IRON LOADING OF RAT LIVERS
LYSOSOMES, EFFECTS ON THE LIVER AND DIS-
RIBUTION AND FATE OF IRON. *(E.)* Arborgh, B. A.
.; Glaumann, H.; Ericsson, J. L. E. (Sabbats-
erg Hosp., Stockholm, Sweden). *Lab. Invest.*
0(5):664-673, 1974.

297 EXPERIMENTAL STUDY OF THE EFFECTS OF
CHOLESTASIS OBTAINED BY GRADUAL STENOSIS OF
HE TERMINAL COMMON BILE DUCT. II. HEMODYNAMIC
SPECTS OF THE CHOLESTATIC LIVER. *(It.)* Toore, G.
.; Mattioli, F. (Inst. Clin. Gen. Surg. Surg. Ther.,
niv. Genoa, Italy). *Minerva Med.* 65(10):553-554,
974.

298 VARYING EFFECT OF PHENOBARBITAL ON HEPATIC
DRUG METABOLISM IN RATS OF DIFFERENT AGES.
E.) Schlede, E. (Inst. Pharmakol., Free Univ.
erlin, Germany). *Naunyn Schmiederbergs Arch.*
harmakol. 282(3):311-315, 1974.

299 EFFECTS OF GROWTH HORMONE, NORETHAN-
DROLONE, AND THE COMBINATION OF THESE
WO AGENTS ON OXYGEN UPTAKE IN RAT LIVER HOMOGENATES.
Fr.) Elsair, J.; Poey, J.; Naceur, J.; Denine, R.;
rabet, N. (Fac. Med. Pharm., Algiers, Algeria).
athol. Biol. (Paris) 22(4):289-296, 1974.

300 INTERFERENCE OF DPPD WITH HEPATIC DRUG
MÉTABOLIZING ENZYME SYSTEM. *(E.)* Gabriel,
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en. Pathol., Univ. Turia, Italy). *Pharmacol. Res.*
ommun. 6(2):127-134, 1974.

301 EFFECT OF TWO ORALLY ACTIVE ESTRADIOL
DERIVATIVES ON SULFOBROMPHTHALEIN RETEN-
ION IN RATS. *(E.)* Galletti, F.; Gardi, R. (Warner
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4302 A NOTE ON THE STORAGE OF IRON AS FERRITIN IN THE PROTEIN DEFICIENT RAT. *(E.)* El Din Achmed, N.; Ramsay, W. N. M. (Med. Sch., Univ. Edinburgh, Scotland). *Q. J. Exp. Physiol.* 59(2):153-157, 1974.

4303 ENZYMATIC ACTIVITY AT THE RAT LIVER MICROSOME LEVEL AFTER INGESTION OF OLEIC ACID, ERUCIC ACID AND THEIR DERIVATIVES. *(E.)* Gaillard, D.; Pipy, B.; Derache, R. (no affil.). *Toxicology* 2(2):165-172, 1974.

4304 EXPERIMENTAL STUDIES ON THE EFFECT OF DECREASES IN FREE FATTY ACIDS ON CARBOHYDRATE METABOLISM IN THE LIVER DURING STARVATION. *(Rus.)* Talke, H.; Kersten, M. (Med. Clin., Univ. Freiburg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1367-1371, 1972.

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4306 ISOENZYMES OF LACTATE DEHYDROGENASE FROM RAT LIVER SERUM UNDER DAMAGE OF LIVER CAUSED WITH CCl_4. *(Rus.)* Gordeeva, G. F. (Inst. Pediatr., Moscow, USSR Acad. Med. Sci.). *Vopr. Med. Khim.* 19(4):422-426, 1973.

See also 4136, 4247, 4251, 4555, 4597, 4861, 4884, 4916.

SECRETION AND METABOLISM

Intestine

307 ROLE OF BILE ACIDS IN THE ACTIVATION OF
TRYPSINOGEN BY ENTEROKINASE: DISTURBANCE
F TRYPSINOGEN ACTIVATION IN PATIENTS WITH INTRA-
EPATIC BILIARY ATRESIA. *(E.)* Hadorn, B.; Hess,
.; Troesch, V.; Verhaage, W.; Gotze, H.; Bender,
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astroenterology 66(4):548-555, 1974.

he effect of bile acids on the activation of tryp-
inogen by the soluble fraction of rat intestinal
omogenates containing enterokinase (EC 3.4.4.8)
as studied. Glycodeoxycholate, 2.5 mM, caused a
.8-fold increase in the velocity of the activation
rocess at low trypsinogen concentrations and a 2-
old increase of the maximal velocity of trypsinogen
ctivation by enterokinase. Sodium taurocholate
ad a similar effect. The same concentration of
glycodeoxycholate caused a decrease of the Michaelis constant for the enterokinase-catalyzed trypsinogen activation: Km was 0.109 mM in the absence of bile acids and fell to 0.015 mM in their presence. The total amount of trypsin formed from a known amount of trypsinogen was also augmented in the presence of bile acids. A similar result was obtained when human pancreatic juice was used as the source of trypsinogen and human small intestinal homogenates as the source of enterokinase. In 3 children with biliary atresia and no bile acids in the duodenal contents, abnormally low trypsin activities were found before and after stimulation of pancreatic function with pancreozymin-cholecystokinin and secretin. Chymotrypsin activity, however, was normal. Evidence was obtained that trypsinogen activation by enterokinase is incomplete in the absence of bile

acids. It is concluded that in the rat and in man bile acids are important for a rapid and complete trypsinogen activation by enterokinase.

4308 A COMPARATIVE STUDY OF THE DISTRIBUTION OF SOLUBLE AND PARTICULATE GLYCYL-L-LEUCINE HYDROLASE IN THE SMALL INTESTINE. *(E.)*

Das, M.; Radhakrishnan, A. N. (Christian Med. Coll. Hosp., Vellore India). *Clin. Sci. Mol. Med.* 46(4):501-510, 1974.

Glycyl-L-leucine hydrolase activity was measured in the soluble and particulate fractions of intestinal mucosa from monkey, (*Macaca radiata*) guinea pig, rabbit, and rat. The specific activity of the soluble enzyme is very high in monkey and guinea pig, and lower in rabbit and rat. The particulate enzymes from all the 4 species show low specific activities and comprise only 1-10% of the total activity. The pH optima in all cases lie in the range 7.6-7.8. The K_m values of the substrate were similar for both soluble and particulate enzyme from monkey and guinea pig, but in the rabbit and rat, the K_m value with the particulate enzyme was higher than with the soluble enzyme. The particulate enzyme activity in all cases was highest in the distal regions of the intestine, whereas the soluble enzyme showed maximal activity in the proximal and middle regions.

4309 CHANGES IN INTESTINAL LACTASE AND ALKALINE PHOSPHATASE ACTIVITY LEVELS WITH AGE IN THE BABOON (Papio papio). *(E.)*

Welsh, J. D.; Russell, L. C.; Walker, Jr., A. W. (Univ. Oklahoma Health Sci. Ctr., Oklahoma City). *Gastroenterology* 66(5):993-997, 1974.

A study of baboons was undertaken to determine whether intestinal enzyme activities decreased with age as they do in some ethnic groups in humans. Eight Olive baboons (*Papio papio*) which had been nursed for up to 6 months by their mothers were killed at 1-36 months of age. The small intestines were divided into 10 equal segments and assayed for disaccharidase, alkaline phosphatase, and leucyl naphthylamidase activities. Lactase and cellobiase values were lower in the duodenum and ileum of 8 to 12-month-old animals than in those 1 to 4 months old. The lowest values all along the intestine were found in the 36-month-old animals. Alkaline phosphatase activity was highest in the 1 to 4-month-old animals, and, after this age, was usually less than half that present in the younger animals. Sucrase, maltase, palatinase, trehalase, and leucyl naphthylamidase activities were essentially similar at all ages. These findings suggest that the low levels of lactase in some human subjects may be a normal age-related phenomenon, as in the baboon.

4310 RADIOLABELED TOXIN FOR STUDYING BINDING OF CHOLERA TOXIN AND TOXOIDS TO INTESTINAL MUCOSAL RECEPTOR SITES. *(E.)*

Peterson, J. W.; Verwey, W. F. (Univ. Texas Med. Br., Galveston). *Proc. Soc. Exp. Biol. Med.* 145(4):1187-1191, 1974.

The binding of choleragen, choleragenoid, and artificial cholera toxoids to intestinal epithelial receptor sites was studied *in vitro* in mucosal homogenates prepared from the small intestines of normal adult guinea pigs. Three concentrations of radiolabeled choleragen were incubated with a series of tubes containing increasing amounts of mucosal homogenate. Increasing levels of radioactivity in the washed homogenate indicated that toxin adsorption increased with increasing concentrations of mucosal homogenate. However, 100% of the labeled toxin was not bound, even when lower concentrations of radiolabeled toxin were added. At the highest concentration of homogenate tested, approximately 50% of the total radioactivity was bound for each of the 3 concentrations of ^{125}I-choleragen added. Binding of ^{125}I-choleragen to mucosal homogenate was inhibited by 50-100 ng/ml of both choleragen and choleragenoid, whereas normal rabbit serum proteins, at comparable and even higher concentrations, failed to inhibit binding. The relative failure of goat immunoglobulin, iodinated by an identical procedure, to bind to the mucosal homogenate also supports the specificity of ^{125}I-choleragen binding. When dilutions of equine antitoxin were incubated with ^{125}I-choleragen prior to the addition of mucosal homogenate, the binding of radiolabeled toxin decreased to a low level as the concentration of antitoxin was increased. The data indicate that cholera toxin binding is highly specific for the toxin and is not inhibited by heterologous protein. In contrast, artificial toxoids, currently under investigation as potential human vaccines, appear to have lost their affinity for the tissue receptor.

4311 THE INFLUENCE OF CHANGING CELL KINETICS ON FUNCTIONAL DIFFERENTIATION IN THE SMALL INTESTINE OF THE RAT. A STUDY OF ENZYMES INVOLVED IN CARBOHYDRATE METABOLISM. *(E.)*

DeBoth, N. J.; Plaisier, H. (Med. Fac., Erasmus Univ., Rotterdam, Netherlands). *J. Histochem. Cytochem.* 22(5):352-360, 1974.

The activity of a number of enzymes involved in carbohydrate metabolism was measured in different cellular compartments of the duodenal epithelium of the rat by microchemical techniques. The enzyme activities were related to different cell positions along crypt and villus and to cell age. Enzyme activities in proliferating, differentiating and functional cell compartments of the intestine of normal rats were compared with those in which the cell kinetics had been modified. The effects of increased proliferative activity within the crypt of normal animals was studied in the intestine during recovery after low radiation doses. The effect of increased lifespan was investigated in germ-free animals. The specific activity of α-glucosidase, present in microvilli, increased considerably during cell differentiation and subsequent cell migration along the villus. Its specific activity remained unchanged in isolated intestinal loops deprived of dissaccharide substrate for 6 weeks. Lactate dehydrogenase and, to a lesser extent, glucose-6-phosphate dehydrogenase had a pattern of activity similar to α-glucosidase. In contrast, hexokinase and isocitrate dehydrogenase were equally distributed among crypt and villus cells and no clear differences were observed with increasing cell age. Increased proliferation in the crypts during recovery after low radiation doses resulted in a marked decrease of α-glucosidase activity in both crypt and villus cells. In the villi of germ-free rats α-glucosidase activity was higher than in the villi of conventional rats. The increased life-span of epithelial cells in germ-free rats had no effect on the level of enzyme activity.

4312 EFFECT OF DEOXYCHOLATE, INDOLE, AND ENDOTOXIN ON ORGAN CULTURES OF RABBIT JEJUNUM.

(E.) Beeken, W. L.; Roessner, K. D.; Krawitt, E. L. (Coll. Med., Univ. Vermont, Burlington). *Gastroenterology* 66(5):998-1004, 1974.

Changes in morphology, protein synthesis, amino acid transport, and brush border enzyme levels produced by deoxycholate (0.01-1.0 mM), *Escherichia coli* lipopolysaccharide (10 and 100 μg/ml), and indole (0.1 and 0.4 M) were studied in an organ culture system. Rabbit jejunum incubated for 24 hr in medium containing 1 mM deoxycholate showed complete loss of villous architecture, dissolution of cell structure, and marked impairment of protein synthesis and amino acid transport, but no significant changes occurred in brush border alkaline phosphatase and sucrase activity. Incubation of jejunal cultures with lower concentrations of deoxycholate, indole, or bacterial endotoxin caused minor morphological alterations, but no functional differences.

4313 THE ROLE OF THE COLON IN THE METABOLISM OF SALICYLAZOSULPHAPYRIDINE.

(E.) Das, K. M.; Eastwood, M. A.; McManus, J. P. A.; Sircus, W. (Western Gen. Hosp., Edinburgh, Scotland). *Scand. J. Gastroenterol.* 9(2):137-141, 1974.

The amount of salicylazosulfapyridine which reaches the colon and the role of the colon in the metabolism of the drug (3-4 g/day p.o.) were studied in 8 patients with a permanent ileostomy after total colectomy, with preservation of rectum in 4, and 2 patients with transverse colostomy. Serum salicylazosulfapyridine concentration and 24-hr urinary excretion of the drug did not alter significantly before surgery and up to 6 months after total colectomy with ileostomy; however, there was a significant decrease in total free sulfapyridine concentration, both in serum and urine, after surgery. Salicylazosulfapyridine concentrations in serum and 24-hr urine were lower in patients with Crohn's disease and ileostomy than in patients with ulcerative colitis and ileostomy, but the results for total free sulfapyridine in serum and urine were the same in both conditions. It appears that only a small proportion of the administered dose of salicylazosulfapyridine is absorbed as unsplit drug from the small intestine. Most of the administered dose reaches the colon, where it is split into its components. After ileostomy there was a significant decrease in drug absorption, so that less than 5% of the administered dose was recovered in the 24-hr urine and the serum concentration was also significantly low.

4314 COMPARISON OF ENDOGENOUS RELEASE OF SECRETIN AND CHOLECYSTOKININ IN PROXIMAL AND DISTAL DUODENUM IN THE DOG.

(E.) Konturek, S. J.; Radecki, T.; Thor, P. (Med. Acad. Krakow, Poland). *Scand. J. Gastroenterol.* 9(2):153-157, 1974.

The relative effectiveness of proximal *versus* distal duodenum in endogenous release of secretin and cholecystokinin was studied in chronic gastric and pancreatic fistula dogs provided with Thiry loops fashioned of upper and lower parts of the duodenum. I.v. infusion of secretin (0.25-16 U/kg/hr) produced a dose-related pancreatic volume flow and bicarbonate secretion that was maximal at a dose of 8 U/kg/hr. I.v. infusion of exogenous cholecystokinin (2-36 U/kg/hr) with a background dose of secretin also resulted in a dose-related pancreatic protein response, with maximal secretion observed for 18 U/kg/hr. Acidification of the proximal duodenal loop produced slightly greater pancreatic bicarbonate response than similar acidification of the distal duodenal loop. The difference in the response obtained with acidification of the loops was statistically significant. Acidification of the proximal and distal duodenal loop resulted in almost equal rates of pancreatic protein outputs, equivalent to that obtained with 2 U/kg/hr of exogenous cholecystokinin, and reached about 30% of the maximal protein output in response to cholecystokinin. Amino acid irrigation of the proximal duodenal loop produced protein output from the pancreatic fistula slightly higher than similar perfusion of the distal duodenal loop. It is concluded that secretin and cholecystokinin releasing capacity/unit length of the duodenum is constant and there is no gradient of releasable intestinal hormones along the duodenum.

4315 HORMONAL STIMULATION OF INTESTINAL DISACCHARIDASE RELEASE IN THE DOG.

(E.) Dyck, W. P.; Bonnet, D.; Lasater, J.; Stinson, C.; Hall, F. F. (Scott White Clin., Temple, Tex.). *Gastroenterology* 66(4):533-538, 1974.

Release of the enteric enzymes -- sucrase, maltase, and lactase -- into the perfused small intestinal lumen of the dog was augmented by i.v. injection of secretin (4.0 U/kg) and cholecystokinin (4.0 Ivy dog U/kg). A direct hormonal stimulation of the intestinal mucosa is considered responsible for the enzyme release, since bile and pancreatic juice were excluded from the perfusion solution. Cholecystokinin exerted a much more pronounced effect on enzyme release than did secretin. Disaccharidase activities in mucosal tissue remained relatively constant after the injection of cholecystokinin.

4316 THE ENZYMATIC CONTENT OF THE SMALL INTESTINE IN THE RATS, AFTER METHOTREXATE TREATMENT.

(E.) Marrone, J. O.; Cantor, D. S.; Cecchetti, C. J.; Costa, J. A. (Profesor Alejandro Posadas Polyclin., Buenos Aires, Argentina). *Acta Gastroenterol. Latinoam.* 5(13):129-132, 1973.

The effect of methotrexate (5 mg/kg i.p. for 3 days) on the intestinal content of disaccharidases and the correlation of this effect with the histological alteration of the small intestinal mucosa were studied in 21 Wistar rats. A control group of 21 rats was injected with normal saline. Lactase concentration averaged 2.00 in the control group and 0.71 in the methotrexate group. Sucrase concentration was 9.27 in the control group and 1.94 in the methotrexate group. Maltase concentration was 41.33 in controls and 16.12 in methotrexate-treated rats. Although the enzymatic defect could not be correlated with tissue changes, methotrexate produced a striking change in all components of the intestinal mucosa. The surface epithelium showed flattening of cells, changing the normal pattern to a cuboid shape. There was also marked alteration of the brush order. The villi were wide and the height was diminished. Crypt cells were flattened, with focal nuclear degeneration and cellular disintegration; the mitotic index was abolished and the lumen of the crypts were dilated and filled with inflammatory cells.

4317 PYRUVATE KINASE ISOZYMES FROM RAT INTESTINAL MUCOSA. CHARACTERIZATION AND THE EFFECT OF FASTING AND REFEEDING. *(E.)* Osterman, J.; Fritz, P. J. (Pennsylvania State Univ. Coll. Med., Hershey). *Biochemistry* 13(8):1731-1735, 1974.

Five electrophoretically distinct zones of pyruvate kinase activity were observed in extracts of jejunal and ileal mucosa from male adult Sprague-Dawley rats. The major form is pyruvate kinase 5 corresponding to the predominant isozyme in rat kidney and the minor isozyme in rat liver. Four of the 5 bands are neutralized by rabbit anti-rat pyruvate kinase 3 (type M). Pyruvate kinase 1 (type L) was not neutralized. Only 4 peaks with pyruvate kinase activity could be resolved by DEAE-Sephadex chromatography and the first 3 peaks had the electrophoretic mobility of pyruvate kinase 5. The fourth peak contained 2 electrophoretically distinct bands, one with the mobility of pyruvate kinase 1 and the other with a mobility between pyruvate kinase 2 and 3. Rat jejunal pyruvate kinase 5 and 1 both displayed sigmoidal kinetics with respect to phosphoenolpyruvate; pyruvate kinase 5 was slightly activated while pyruvate kinase 1 was strongly activated by fructose 1,6-diphosphate. Jejunal pyruvate kinase activity decreased about 50% between 24 and 48 hr after withdrawal of food. When the rats were refed, jejunal pyruvate kinase activity increased and reached a peak 72 hr after refeeding that was about 50% greater than control values. Thereafter, enzyme levels returned to control levels. The changes in pyruvate kinase activity were shown by immunological techniques to be due to changes in enzyme protein. It was demonstrated that all 5 electrophoretic forms of the enzyme were affected similarly by fasting and refeeding.

4318 RECIPROCAL ADAPTIVE CHANGES IN INTESTINAL Na^+ K^+-ATPase AND ADENYL CYCLASE AFTER SMALL BOWEL RESECTION IN THE RAT. *(E.)* Oya, R.; Weser, E. (Univ. Texas Med. Sch., San Antonio). *Gastroenterology* 66(4):757, 1974.

4319 THE ROLE OF BILIARY LECITHIN AS A PRECURSOR OF MUCOSAL MICROSOMAL (M) AND PRECHYLOMICRON (PC) LECITHIN. *(E.)* Rodgers, J. B.; O'Brien, R. J.; Balint, J. A. (Albany Med. Coll., N.Y.). *Gastroenterology* 66(4):766, 1974.

4320 INCREASED TURNOVER OF INTESTINAL MUCOSAL CELLS INDUCED BY TAUROCHOLATE. *(E.)* Roy, C. C.; Laurendeau, G.; Doyon, G.; Chartrand, L. (St. Justine Hosp., Montreal, Canada). *Gastroenterology* 66(4):768, 1974.

4321 INTESTINAL HYDROLYSIS OF TRIPEPTIDES IN VIVO: SOME UNEXPECTED ASPECTS. *(E.)* Arvanitakis, C.; Folscroft, J.; Rhodes, J. B. (Kansas Univ. Med. Ctr., Kansas City). *Gastroenterology* 66(4):832, 1974.

4322 INTESTINAL METABOLISM OF PLASMA FREE FATTY ACIDS (FFA). *(E.)* Gangl, A.; Ockner, R. (Univ. California, San Francisco). *Gastroenterology* 66(4):841, 1974.

4323 EFFECT OF ALTERED FOLATE UTILIZATION ON THYMIDINE INCORPORATION IN RABBIT INTESTINE. *(E.)* Hermos, J. A.; Vachon, J. D. (Boston VA Hosp., Mass.). *Gastroenterology* 66(4):843, 1974.

4324 EFFECT OF THYROXINE ON MICROVILLAR AND LYSOSOMAL ENZYMES IN THE SMALL INTESTINE OF SUCKLING RATS. *(E.)* Koldovsky, O.; Jumawan, J.; Palmieri, M. (Children's Hosp., Philadelphia, Pa.). *Gastroenterology* 66(4):848, 1974.

4325 HYDROLYSIS OF RELATED TRI- AND DIPEPTIDES BY HAMSTER MICROVILLUS MEMBRANES. *(E.)* Ruhlen, J.; Rhodes, J. B. (Univ. Kansas Med. Sch., Kansas City). *Gastroenterology* 66(4):863, 1974.

4326 HYDROLYSIS OF RELATED TRI- AND DIPEPTIDES BY HAMSTER MICROVILLUS MEMBRANES. *(E.)* Ruhlen, J.; Rhodes, J. B. (Univ. Kansas Med. Sch., Kansas City). *Gastroenterology* 66(4):863, 1974.

4327 BILIARY EXCRETION OF IODIPAMIDE. *(E.)* Berk, R. N.; Loeb, P. M.; Feld, G. K.; Wheeler, H. O. (Univ. California, San Diego, Sch. Med., La Jolla). *Gastroenterology* 66(4):875, 1974.

4328 PITFALLS IN HISTOCHEMICAL LOCALIZATION STUDIES OF NADPH GENERATING ENZYMES OR ENZYME SYSTEMS IN RAT SMALL INTESTINE. *(E.)* Leeflang-de Pijper, A. M.; Hulsmann, W. C. (Med. Fac., Erasmus Univ., Netherlands). *Histochemistry* 39(2):143-153, 1974.

4329 CYCLIC ADENOSINE MONOPHOSPHATE CONTROLS BILE SALT AND HYDROXY FATTY ACID-INDUCED COLONIC ELECTROLYTE SECRETION. *(E.)* Binder, H. J. (no affil.). *J. Clin. Invest.* 53(6):7a-8a, 1974.

4330 ABSENCE OF FOLIC ACID CONJUGASE IN PROXIMAL GASTROINTESTINAL SECRETIONS IN MAN. *(E.)* Graham, D. Y.; Godwin, H. A. (no affil.). *J. Clin. Invest.* 53(6):29a, 1974.

4331 INTESTINAL FATTY ACID BINDING PROTEIN (FABP): STUDIES OF PHYSIOLOGICAL FUNCTION. *(E.)* Ockner, R. K.; Manning, J. A. (no affil.). *J. Clin. Invest.* 53(6):57a, 1974.

4332 ROLE OF HEME OXYGENASE IN INTESTINAL ABSORPTION OF HEMOGLOBIN IRON. *(E.)* Raffin, S. B.; Woo, C. H.; Schmid, R. (no affil.). *J. Clin. Invest.* 53(6):62a-63a, 1974.

4333 INTESTINAL LIPODYSTROPHY IN NORMAL RATS INDUCED BY PROLONGED TRIGLYCERIDE (TG) PERFUSION. *(E.)* Sabesin, S. M.; Clark, S. B.; Wu, A. L.; Holt, P. R. (no affil.). *J. Clin. Invest.* 53(6):69a, 1974.

4334 SUCRASE PRECURSOR IN HUMAN JEJUNAL CRYPTS. *(E.)* Silverblatt, E. R.; Conklin, K.; Gray, G. M. (no affil.). *J. Clin. Invest.* 53(6): 76a, 1974.

4335 INTESTINAL CELL TRANSIT TIME IN THE MONGOLIAN GERBIL, Meriones unguiculatus. *(E.)* Sigdestad, C. P.; Connor, A. M.; Czerwonka, O. R. (Radiat. Ctr., Univ. Louisville, Ky.). *Experientia* 30(4):344-345, 1974.

4336 INHIBITION OF A MINOR PATHWAY OF L-DOPA METABOLISM IN THE INTESTINAL LUMEN USING A DECARBOXYLASE INHIBITOR (RO 4-4602). *(E.)* Bakke, O. M.; Scheline, R. R. (Dept. Pharmacol., Univ. Bergen, Norway). *J. Pharm. Pharmacol.* 26(5): 377-379, 1974.

4337 THE EFFECT OF VAGOTOMY ON RESTING AND STIMULATED SERUM GASTRIN LEVELS. *(E.)* Battle, W. S.; Archer, R.; Alavi, S. M.; Ziaja, B. A.; Nyhus, L. M.; Bombeck, C. T. (Abraham Lincoln Sch. Med., Chicago, Ill.). *J. Surg. Res.* 16(4):346-352, 1974.

See also 4136, 4151, 4152.

GENERAL

4338 COMPARATIVE STUDY ON TWO LYSOSOMAL-MARKER ENZYMES FROM LIVER AND INTESTINAL MUCOSA. *(E.)* Baglioni, T.; Cavallone, E.; Locatelli, A.; Simonic, T. (Veterinary Univ., Milan, Italy) *Ital. J. Biochem.* 22(4):186-201, 1973.

Properties of 2 lysosomal enzymes, acid phosphatase and β-glucuronidase, of intestinal mucosa were compared with those of liver. Wistar rats were used as the source of the enzymes and the different preparations studied consisted of lysosomal and supernatant fractions. The properties tested were the relative activities of the different fractions and the response of the fractions to various labilizing treatments which facilitated release of enzyme. Supernatant activities for both acid phosphatase and β-glucuronidase, relative to total activity, were higher in intestinal mucosa than in liver. Labilizing treatments with non-ionic detergents (Triton X-100 and Nonidet P40), freezing and thawing, osmotic shock by dilution with water, high sodium chloride concentration, or heat caused release of both enzymes in the liver preparations, particularly in the lysosymal fractions, but not in the intestinal mucosal preparations. The results suggest differences in enzyme molecular structure related to differences in source of tissue.

4339 DEMONSTRATION OF COLLATERAL ARTERIAL FLOW AFTER INTERRUPTION OF HEPATIC ARTERIES IN MAN. *(E.)* Mays, E. T.; Wheeler, C. S. (Price Inst. Surg. Res., Univ. Louisville, Ky.). *N. Engl. J. Med.* 290(18):993-996, 1974.

Of 50 patients who had therapeutic ligation of various hepatic arteries, 20 were routinely evaluated during the postoperative period by angiography and radionuclide scanning. The hepatic arteries in these patients were intentionally occluded to control hemorrhage and tumor growth or as part of "en bloc" resection for cancer. Of the 20, 11 had the right ramus ligated as close to the liver as possible, 5 the left ramus, and in 4 the common hepatic artery was interrupted. Revascularization of the interrupted hepatic artery was noted in all 20 patients. When either the right or left hepatic artery was interrupted, intrahepatic translobular vessels established flow in the ligated system. Such intrahepatic vessels between the right and left rami are not seen in cadaver liver perfusions, nor on arteriograms of normal subjects. Thus, they are probably under neurohumoral control. If the common hepatic artery is interrupted, revascularization occurs through inferior phrenic, pancreaticoduodenal and intercalary *de novo* arteries. Hepatic arterial flow was reconstituted distal to the ligature as early as 10 hr after interruption and increased with time. Liver necrosis after hepatic artery ligation in man is rare if portal-vein flow and oxygenation are optimum until arterial flow is reconstituted. The rapidity with which revascularization occurs suggests that the dearterialization of the liver in an effort to produce necrosis of metastastic and primary hepatic tumors will have only a temporary effect on tumor growth, and would be of value mainly for relieving symptoms produced by local tumor growth.

4340 IN VIVO LOCALISATION OF RADIOLABELLED ANTIBODIES TO CARCINOEMBRYONIC ANTIGEN IN HUMAN COLON CARCINOMA GRAFTED INTO NUDE MICE.

(E.) Mach, J. P.; Carrel, S.; Merenda, C.; Sordat, B.; Cerottini, J. C. (Ludwig Inst. Cancer Res., Lausanne, Switzerland). *Nature* 248(5450): 704-706, 1974.

Volumes of 0.2 ml containing about 2 μg ^{131}I-labeled, purified goat antibody against human carcinoembryonic antigen and 200 μg normal goat 7S globulin were injected into nude mice (Balb/c Nu-Nu) bearing subcutaneous grafts of human colon carcinomas and also into control nontumor-bearing mice. After 2 to 6 hr, the radioactivity, as detected by external scintillation scanning, was homogeneously distributed throughout both tumor-bearing mice and controls. After 1 day, however, radioactivity began to localize in the tumor area, giving optimal contrast by the third day. The animals were then dissected and separate organs and pieces of the body were weighed and measured for radioactivity. For a 24 g mouse, for example, 40% of the total radioactivity was concentrated within the 1.8 g tumor which the mouse bore. The smallest tumor nodule detectable by scanning was 200 mg. To test for possible nonspecific accumulation of injected globulins in the extravascular space and necrotic regions of the tumor, additional experiments were carried out in which antibody localization was studied after simultaneous injection of ^{131}I-labeled antibody and ^{125}I-labeled normal goat 7S globulin, or of the two materials with reversed labels. The results showed that in the tumor the concentration of antibody was more than twice that of normal 7S globulin, whereas in normal tissue the antibody was present in lower concentration than the normal globulin. When a specificity index was calculated by dividing the ratio of tumor antibody concentration: normal tissue antibody concentration by the same ratio for normal 7S globulin, significantly positive results were obtained for all colon carcinomas tested. In contrast, when the same experiment was performed in C57BL/6 mice bearing transplanted EL4 solid lymphoma, specificity indices were not significant. The specificity of the antibody localization decreased with the presence of necrotic tissue within the tissue. However, a nonnecrotic fragment showed a very high specificity index and when cells from disrupted tumor fragments were washed with buffered saline, 55% of the antibody radioactivity remained bound to the cells compared with only 15% of the normal 7S globulin radioactivity.

4341 IMMUNOGLOBULINS IN FECES FROM INFANTS FED HUMAN OR BOVINE MILK. *(E.)*

Haneberg, B. (Univ. Bergen, Sch. Med., Norway). *Scand. J. Immunol.* 3(2):191-197, 1974.

In feces from infants fed human milk, the concentration of human immunoglobulins, particularly I_gA, were higher than in feces from infants fed cow's milk. The same kind of difference between the two feeding groups, at 1 month of age, was also evident for the antibody activity in feces, using agglutinins to rabbit erythrocytes as markers. A good correlation between levels of antibody in milk and in feces of infants receiving that milk indicated that part of the antibodies in feces was derived from the milk. No difference in agglutinin activity was noted, however, in infants 2-3 months of age. The higher antibody activity in feces of infants receiving human milk could mean that the infants' own intestinal antibodies are better preserved, that their production is stimulated, or that human milk antibodies pass through the intestinal tract. Evidence supporting the last interpretation was provided by the finding that isoagglutinins in human milk to blood group antigens A and B were recovered in feces from infants receiving this milk, regardless of the infants' own blood group. Gel filtration studies, as well as inhibition of agglutination and antiglobulin test, gave evidence that IgA was largely responsible for the fecal agglutinin activity. Unlike human milk in which IgM also reacts with rabbit erythrocytes, only IgA in the fecal extracts had such activity. IgA antibodies in human milk thus retained some of their activity with passage through the infant gut.

4342 A STUDY OF INTERCELLULAR SPACES IN THE RABBIT JEJUNUM DURING ACUTE VOLUME EXPANSION AND AFTER TREATMENT WITH CHOLERA TOXIN. *(E.)*

DiBona, D. R.; Chen, L. C.; Sharp, G. W. G. (Massachusetts Gen. Hosp., Boston). *J. Clin. Invest.* 53(5):1300-1307, 1974.

The effects of acute volume expansion and of intraluminal administration of cholera toxin (10 μg) were examined in rabbit jejunum. Acute volume expansion reversed the normal reabsorptive flux of water and caused significant fluid secretion. Phase and electronmicroscopic examination of the jejunal epithelium showed that marked distension of the intercellular spaces had occurred. Examination of the jejunal epithelium after treatment with cholera toxin showed that in association with high rates of fluid secretion, the intercellular spaces were extremely small and lateral membranes of adjacent cells were in close apposition to one another. Thus the mechanisms of fluid secretion in these 2 situations appear to be quite different. The secretion associated with volume expansion, and accompanied by a rise in venous pressure and bullous deformations of terminal junctions, could be due to hydrostatic pressure, applied through intercellular channels. The secretion of cholera appears to be unrelated to hydrostatic pressure and is more likely due to body-to-lumen active ion transport.

4343 THE INFLUENCES OF MECHANICAL FACTORS ON INTESTINAL LYMPH FLOW AND THEIR RELATIONSHIP TO OPERATIONS FOR CARCINOMA OF THE INTESTINE. *(E.)* Ackerman, N. B. (Menorah Med. Ctr., Univ. Missouri, Kansas City). *Surg. Gynecol. Obstet.* 138(5):677-682, 1974.

The effects of various mechanical factors on the flow of lymph from the intestines were studied in mongrel dogs. Manual massage of the intestines caused an immediate highly significant increase in lymph flow. When pressures within the lumen of the intestines were elevated slightly above normal by the introduction of air, lymph flow increased markedly. Generally, as intraluminal pressures rose further to extremely high levels (60 mm Hg), the initially elevated rates of lymph flow decreased. As intraluminal pressures were decreased, a secondary rise in lymph flow often occurred. Hyperperistalsis, produced by direct electrical stimulation, also caused rapid, dramatic increases in lymph flow, but since intraluminal pressures rose during periods of hyperperistalsis, the mechanical effects of muscular activity alone could not be determined. It is probable that the decreased survival rate of patients with obstructing carcinomas of the colon, is partly due to the higher flow of lymph from the area of the carcinoma causing an increased dissemination of cancer cells. Thus, all diagnostic, preparatory, and operative procedures which may increase pressures on the intestinal wall or within the lumen should be minimized. These procedures include palpation of the abdomen, barium and air contrast enema studies, colonoscopy, cleansing enemas and cathartics, and excessive handling and palpation of the carcinoma and adjacent intestine during the operation.

4344 DUODENAL VILLUS AREA AND EPITHELIAL CELLULAR MIGRATION IN CONVENTIONAL AND GERM-FREE CHICKS. *(E.)* Cook, R. H.; Bird, F. H. (Dept. Anim. Vet. Sci., Univ. Maine, Orono). *Poult. Sci.* 52:2276-2280, 1973.

The morphological and epithelial cellular kinetic differences noted in the small intestine of older germ-free animals were studied to see if they would manifest themselves in week-old Leghorn chicks. By day 7, the villus area was significantly larger and the crypt depth was significantly deeper in the conventional chicks than in the germ-free chicks. The active proliferative cellular pool in the crypts of the conventional checks was more than twice the size of the analogous proliferative compartments in the germ-free chicks. In addition, the rate of epithelial cellular migration from the crypt villus junction to the villus tip was approximately 1.7 times faster in the conventional chicks. A bacteria-induced extrusion process may have had a significant effect on epithelial cellular kinetics and duodenal mucosal growth processes in the young chicks.

4345 IMMUNOGLOBULINS ON THE SURFACE OF HUMAN APPENDIX LYMPHOCYTES. *(E.)* Jubert, A. V.; McBride, C. M.; Mavligit, G.; Gutterman, J. U.; Hersh, E. M. (Univ. Texas, M. D. Anderson Hosp. Tumor Inst., Houston). *Immunol. Commun.* 3(1):1-9, 1974.

The proportion of appendix and peripheral blood lymphocytes with IgM, IgG, IgA, and IgE cell surface determinants was measured by membrane immunofluorescence in 14 patients with primary carcinomas. IgM was found in 9.2% of appendix lymphocytes compared with 3.5% of simultaneously collected peripheral blood lymphocytes. In contrast, IgG was found on 6.3% of peripheral blood lymphocytes compared with only 3.0% of appendix lymphocytes. There was no difference in the number of cells with IgA or IgE determinants between the two populations. Since surface-bound immunoglobulins are a marker of B-lymphocytes (B cells) in man, these results indicate that a substantial proportion of human appendix lymphocytes are B cells. The higher level of IgM, if confirmed by further studies, would point to some central role for the human appendix lymphocyte immunologic reactivity.

4346 MEASUREMENT OF PANCREATIC BLOOD FLOW IN DOG BY ^{133}Xe CLEARANCE TECHNIQUE. *(E.)* Ercan, M. T.: Bor, N. M.; Bekdik, C. F.; Oner, G. (Dept. Nuclear Med., Hacettepe Univ., Ankara, Turkey). *Pfluegers Arch.* 348(1):51-57, 1974.

The water/gas, plasma/gas, erythrocyte/gas and pancreas/gas partition coefficients of ^{133}Xe were measured at 37°C in dog tissues. The pancreas/blood partition coefficients were calculated from these values and plotted as a function of hematocrit. The ^{133}Xe pancreas/blood partition coefficient in the normal range was 1.2 ml/g. Pancreatic blood flow was determined in each case by injecting ^{133}Xe into the pancreaticoduodenal artery (mean 106.8 ml/100 g/min). Pancreatic blood flows were also determined by injecting the tracer into the tissue of head, body, and the tail of pancreas. The means were 62.4, 85.7, and 67.1 ml/100 g/min, resp. The mean pancreatic blood flow obtained by intra-arterial injection was significantly different from the results obtained by injecting ^{133}Xe into the head or tail, but was not statistically different from that obtained by injection into the body of pancreas. The results obtained by injecting ^{133}Xe into the head, body, and tail of the pancreas were not significantly different from one another. The large network of anastomoses between pancreatic blood vessels and the vasculature of adjacent organs may partially account for this discrepancy.

4347 GLUCAGON INDUCES PREMATURE STRUCTURAL DIFFERENTIATION OF FETAL HEPATOCYTES. *(E.)* Chiu, H. F.; Phillips, M. J. (Toronto Gen. Hosp., Canada). *Lab. Invest.* 30(3):305-310, 1974.

The effects of glucagon on the liver of fetal rats have been studied ultrastructurally. On the 20th day of gestation females were laparotomized and glucagon was injected through the uterine wall and i.p. into 4 fetuses of each pregnant rat (0.0125 mg/g/fetus). Within 6 hours after glucagon administration, immature glycogen-filled fetal hepatocytes showed significant strucutral differentiation. Glycogen depletion, increase in ribosome-coated vesicles, peroxisomes, and primary lysosomes, hypertrophy of the Golgi apparatus, and formation of secondary lysosomes were observed. In addition, a tubular anastomosing network of smooth membranes appeared in the hepatocytes. These cytologic changes were similar to those that ensue physiologically following birth, and coincide with known biochemical effects of glucagon in the fetal liver: induction of glycogenolysis, gluconeogenesis, and enzyme activation. Glucagon may be implicated in the differentiation of fetal liver cells in the perinatal period.

4348 ON THE CORROSIVE PROPERTIES OF BILE AND PANCREATIC JUICE ON LIVING TISSUE IN DOGS. *(E.)* Wickbom, G.; Bushkin, F. L.; Linares, C.; Dragstedt, L. R. (Coll. Med., Univ. of Florida, Gainsville). *Arch. Surg.* 108(5):680-684, 1974.

Regurgitation of bile, pancreatic juice, or duodenal secretions into the stomach or esophagus occurs under certain conditions and has been incriminated as the cause of gastritis and alkaline esophagitis. In an experimental study in dogs, bile was diverted into the stomach and into the ileum for 4 months without producing substantial mucosal changes. In similar experiments, pancreatic juice was diverted into the stomach and colon for 1 to 12 months, again without producing mucosal damage. The parenchyma of the spleen and kidney was exposed to concentrated gallbladder bile for long periods without undergoing substantial changes. These findings suggest that individual duodenal secretions produce little or no damage on contact with the gastrointestinal mucosa of the dog or on the parenchyma of the spleen or kidney.

4349 ISOLATION AND CHARACTERISTICS OF GUT MUCOSAL LYMPHOCYTES. *(E.)* Rudzik, O.; Bienenstock, J. (McMaster Univ. Med. Ctr., Hamilton, Canada). *Lab. Invest.* 30(3):260-266, 1974.

Gut mucosal lymphocytes, exclusive of Peyer's patch cells, were isolated from New Zealand White rabbits by a newly devised technique. An average yield of 37×10^6 lymphoid cells were obtained from 10 g of ileum after passage through a glass bead column and a discontinuous density gradient. The viability was always greater than 95% and the cell suspension was contaminated with less than 1% of epithelial cells. The majority (78%) of the cells were small and medium sized lymphocytes. However, large lymphocytes and blast cells were also present. The cells remained viable in cultures for up to 72 hr *in vitro* and incorporated ^{3}H-uridine and ^{3}H-thymidine. Only 1% of the cell population contained intracellular immunoglobulin as judged by immunofluorescent techniques. This was mainly of the IgA class. On an average, 25% of the lymphoid cells contained metachromatic cytoplasmic granules. The granules were stained at low pH with Alcian Blue, metachromatically with toluidine blue, and nonspecifically with fluoresceinated goat anti-rabbit immunoglobulin reagents. Since these granular lymphoid cells were found only in the epithelium (rarely in lamina propria), it is assumed that these cells were isolated from the epithelium. These techniques have been applied to the guinea pig and to man with equal success in terms of yield and recovery. The availability of mucosal lymphocytes for direct study is a crucial step toward the investigation and interpretation of mucosal cellular immunity.

4350 EFFECT OF PHARMCOLOGICAL DOSES OF GLUCAGON ON HUMAN HEPATIC CIRCULATION. *(Ger.)* Wicklmayr, M.; Dietze, G.; Czempiel, H.; Hepp, K. D.; Mehnert, H.; Henftling, H. G. (Schwabing Hosp., Munich, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:933-936, 1973.

4351 IMMUNOLOGICAL AND ELECTRON MICROSCOPE FINDINGS AFTER THE DEVELOPMENT OF HEPATIC AUTOANTIBODIES. *(Ger.)* Intorp, H. W.; Stohlmann, J.; Gruber, H.; von Bassewitz, D. B. (Med. Clin., Univ. Munster, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:654-657, 1973.

4352 RADIOIMMUNOASSAY OF CHOLECYSTOKININ-PANCREOZYMIN: IMMUNOREACTIVITY OF CCK ANALOGUES AND TISSUE EXTRACTS. *(E.)* Harvey, R. F.; Baker, P. G.; Dowsett, L.; Hartog, M.; Read, A. E. (Univ. Dept. Med., Bristol, England). *Gastroenterology* 66(4):707, 1974.

4353 BILIRUBIN-METAL ION COMPLEXES. *(E.)* Van Norman, J. D.; Humans, M. M. (Dept. Chem., Youngstown State Univ., Ohio). *Anal. Chem.* 46(7):926-929, 1974.

4354 ANOMALIES IN THE URINARY ORGANS AND RECTUM IN THE OFFSPRING OF IRRADIATED RATS. *(E.)* Chaika, E. N. (Dept. Normal Anat., Med. Inst., Minsk, USSR). *Arkh. Anat. Gistol. Embriol.* 64(5):39-44, 1973.

4355 LOCAL CHARACTERISTICS OF BLOOD AND LYMPHATIC VASCULAR BEDS OF THE SMALL INTESTINE IN NORMAL ALBINO RATS AND IN ACUTE EXPERIMENTAL PERITONITIS. *(Rus.)* Shakhmuradjan, R. N. (Med. Inst. Hyg. Sanit., Leningrad, USSR). *Arkh. Anat. Gistol. Embriol.* 64(6):35-39, 1973.

4356 EFFECT OF THE PROTEIN CONTENT OF THE DIET ON THE VITAMIN B_{12} STATUS IN RATS. *(E.)* Jathar, V. S.; Satoskar, R. S.; Mehta, B. M.; Rege, D. V. (Seth G. S. Med. Coll., Bombay, India). *Br. J. Nutr.* 31(2):219-225, 1974.

4357 A STUDY OF THE AUTONOMIC NERVES AND NEURONS OF THE MAMMALIAN GASTROINTESTINAL TRACT. *(E.)* Olander, K. W. (Tulane Univ., New Orleans, La.). *Diss. Abs. Int.* 34(11):5294-B, 1974.

4358 MECHANISM OF SHIGELLA INHIBITION BY THE MOUSE INTESTINAL MICROFLORA. *(E.)* Onderdonk, A. B. (Univ. Missouri, Columbia). *Diss. Abs. Int.* 34(11):5579-B, 1974.

359 THE EFFECT OF MONOAMINE OXIDASE INHIBITORS ON THE RECTAL TEMPERATURE OF THE RAT. *(E.)* ummers, R, J. (Dept. Pharmacol., Univ. Glasgow, cotland). *J. Pharm. Pharmacol.* 26(5):335-343, 1974.

360 STUDIES OF RUMEN METABOLISM. VIII. CHARACTERISTICS OF LIPASES IN RUMEN CONTENTS AND N RUMEN BACTERIA. *(E.)* Faruque, A. J. M. O.; arvis, B. D. W.; Hawke, J. C. (Dept. Chem., Massey niv., Palmerston North, New Zealand). *J. Sci. ood Agr.* 25(4):439-449, 1974.

361 GANGLIOSIDES AS MEMBRANE RECEPTORS FOR TETANUS TOXIN, CHOLERA TOXIN AND EROTONIN. *(E.)* Van Heyningen, W. E. (Sir illiam Dunn Sch. Pathol., Univ. Oxford, England). *ature* 249(5456):415-417, 1974.

4362 IMMUNOLOGICAL EVENTS ASSOCIATED WITH *Taenia taeniaeformis* INFECTIONS IN THE LABORATORY RAT. *(E.)* Leid, Jr., R. W. (Michigan State Univ., Lansing). *Diss. Abs. Int.* 34(12): 6081-B, 1974.

4363 DETERMINATION OF THE COLONIZATION RESISTANCE OF THE DIGESTIVE TRACT OF INDIVIDUAL MICE. *(E.)* Van Der Waaij, D.; Berghuis, J. M. (Radiobiol. Inst., Rijswijk, Netherlands). *J. Hyg. (Camb.)* 72(3):378-387, 1974.

See also 4232, 4288.

DIAGNOSTIC PROCEDURES

4364 CLINICAL EVALUATION OF THE ^{14}C FAT ABSORPTION TEST. *(E.)* Burrows, P. J.; Fleming, J. S.; Garnett, E. S.; Ackery, D. M.; Colin-Jones, D. G.; Bamforth, J. (Southampton Gen. Hosp.). *Gut* 15(2):147-150, 1974.

The absorption of ^{14}C-labeled glyceryl tripalmitate was tested in 62 patients by determining the maximum specific activity of CO$_2$ in the breath after an oral dose. A significant correlation with fecal fat excretion was found. The absorption of ^{14}C labeled palmitic acid was tested subsequently in 54 patients. In cases of pancreatic steatorrhoea, normal absorption of palmitic acid with impaired absorption of glyceryl tripalmitate was found, whereas in most patients with coeliac disease the absorption of both substances was depressed to the same extent.

4365 ENDOSCOPIC AND BIOPSY CRITERIA FOR THE DIAGNOSIS OF ESOPHAGITIS WITH A FIBEROPTIC ESOPHAGOSCOPE. *(E.)* Kobayashi, S.; Kasugai, T. (Aichi Cancer Ctr. Hosp., Nagoya, Japan). *Am. J. Dig. Dis.* 19(4):345-352, 1974.

Endoscopic and biopsy criteria for the diagnosis of esophagitis with a fiberoptic esophagoscope were introduced and a good correlation between them was reported in 144 patients. In 96 of the patients, there was nonspecific esophagitis in esophagoscopy and the remaining 48 patients had no endoscopic abnormalities. Erosion and ulceration were reliable endoscopic signs of esophagitis, with histological confirmation in every case. An endoscopic finding of erythema alone was of less value. A pronounced ingrowth of the lamina propria with associated capillaries into the squamous epithelium represents esophagitis and is often associated with an erythematous mucosal change on endoscopy. It has been emphasized that this may be demonstrated even without the whole of the lamina propria in the biopsy specimen. A histological diagnosis of esophagitis was made in 90% of the patients with endoscopic esophagitis. Thus the criteria introduced here seem to be acceptable for the diagnosis of esophagitis from endoscopic biopsy specimens.

4366 FALSE-NEGATIVE ^{75}SE-SELENOMETHIONINE SCANS IN PRIMARY LIVER CANCER. *(E.)* Kew, M. C.; Geddes, E. W.; Levin, J. (Johannesburg Hosp., South Africa). *J. Nucl. Med.* 15(4):234-236, 1974.

Selenium-75-selenomethionine and ^{99m}Tc-sulfur colloid scans were performed in 45 Southern African blacks with proven primary cancer of the liver and 28 patients with other space-occupying hepatic lesions. In 6 of the cancer patients, the defect or defects visible on the ^{99m}Tc-sulfur colloid scan were not seen on the ^{75}Se-selenomethionine scan, and in 17 patients they had partially disappeared. In the remaining 22 cancer patients and the 28 control patients, the 2 scans were identical. The high incidence of failure of uptake of ^{75}Se-selenomethionine by the tumor is attributed to the anaplastic nature of the neoplasm and the frequency with which tumor necrosis occurs in Southern African blacks with primary cancer of the liver.

4367 RADIOLOGIC DIAGNOSIS OF ILEAL CARCINOID TUMOURS. *(E.)* Boijsen, E.; Kaude, J.; Tylen, U. (Dept. Diagnostic Radiol., Univ. Lund, Sweden). *Acta Radiol. Diagn., Stockh.* 15(1):65-82, 1974.

Nine men and 6 women, aged 32-75 yr, with proven carcinoid tumors of the ileum were examined over a period of 7 years. All of the carcinoid tumors were in the terminal part of the ileum. All patients had metastases in the mesenteric lymph nodes and 11 had metastases in the liver. Calcifications located in the center of the retracted mesentery or close to it were demonstrated in 7 patients. In 9 of 12 patients examined, the degree and type of dilation of the distal ileal loops differed. Vascular changes at superior mesenteric angiography suggested a carcinoid neoplasm of the ileum in 14 of the patients. Arterial wall infiltration, either smooth or irregular, was invariably present and ranged from slight narrowing to complete occlusion. Totruous arteries representing collaterals were observed in 14 patients. Accumulation of contrast medium within the growth was marked in 3 and slight in 4 patients; both the primary growth and local metastases were hypervascular. Hepatic metastases were present in 9 out of 12 patients on whom celiac or hepatic angiography was performed. In 7 of these patients metastases were highly vascularized. An angiographic diagnosis cannot be made until the ileal carcinoid has extended to the mesentery and infiltrated the lymph nodes.

4368 TRYPSIN AND CHYMOTRYPSIN IN DUODENAL ASPIRATE AND FAECES IN RESPONSE TO SECRETIN AND CHOLECYSTOKININ-PANCREOZYMIN. *(E.)* Sale, J. K.; Goldberg, D. M.; Thjodleifsson, B.; Wormsley, K. G. (Roy. Hosp., Sheffield, England). *Gut* 15(2):132-138, 1974.

The secretion of trypsin and chymotrypsin into the duodenum in response to secretin (1.0 clinical U/kg i.v.) and cholecystokinin-pancreozymin (1.0 Ivy U/kg i.v.) was compared with fecal excretion of the enzyme in 47 subjects undergoing clinical investigation of pancreatic exocrine function. There was significant correlation between chymotrypsin outputs in duodenal aspirate and feces. In 53% of the subjects the fecal content of chymotrypsin during the first 6 hr was greater than duodenal aspirate output, and the proportion increased to 74% with the total 24-hr collection. Fecal output of less than 1/2 the duodenal output of chymotrypsin was found in only 3 subjects. The relation between duodenal and fecal outputs was not as good for trypsin. In the majority of cases trypsin output was less in feces than in duodenal aspirate, both in the 6-hr (81% of patients) and 24-hr collections (72% of patients). When the fecal content of trypsin was high, pancreatic capacity to secrete trypsin was also high; however, the converse was not necessarily true since very low levels of tryptic activity were found in subjects with normal capacity to secrete trypsin. These results indicate that fecal excretion of chymotrypsin following stimulation with secretin plus cholecystokinin-pancreozymin is a reliable index of pancreatic enzyme-secretory capacity.

4369 DIAGNOSTIC SIGNIFICANCE OF THE TREHALOSE TOLERANCE TEST IN MALABSORPTION SYNDROMES.

(Ger.) Bolte, J. P.; Schonhage, P.; Forster, E.; Knolle, J.; Meyer zum Buschenfelde, K. H. (2nd Med. Clin., Univ. Mainz, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1303-1307, 1972.

Absorption of glucose, trehalose, lactose, and sucrose was studied on 58 patients by measuring blood sugar levels before and for 15-180 min after p.o. administration of 50 g of each of the sugars. These patients had Crohn's disease (8 cases), ulcerative colitis (11), malabsorption (6), cirrhosis (6), chronic pancreatitis (7), and miscellaneous gastrointestinal disorders (20) including peptic ulcer, generalized amyloidosis, Reiter's disease, abdominal vascular disorders, Billroth II gastroenterostomies, and intestinal shunt surgery performed for obesity. Of the disaccharides, approximately equal quantities of lactose and trehalose were absorbed while the quantity of sucrose absorbed was higher although it contains only 1 molecule of glucose. Lactose intolerance occurred in almost all of the disease states investigated, whereas trehalose intolerance was found primarily in malabsorption, ulcerative colitis, and Crohn's disease and sucrose intolerance occurred in malabsorption. These findings indicate that trehalose intolerance or malabsorption, either alone or in combination with other disaccharide intolerances, is rare. Trehalose intolerance is more useful than lactose intolerance in the diagnosis of primary malabsorption since lactose intolerance can occur as an incidental finding in patients with a great variety of primary diseases.

4370 MECHOLYL ESOPHAGOGRAPHY.

(E.) Ennis, J. T.; Lewicki, A. M. (Peter Bent Brigham Hosp., Boston, Mass.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 119(2):241-244, 1973.

Administration of methacholine s.c. combined with cinefluorography offers an easy and accurate assessment of achalasia. A positive response to an initial 2.5 mg dose may occur within 2-3 min and is seen as a lumen-obliterating contraction of the esophagus with reflux of barium into the patient's mouth. If contraction does not occur, the dosage can be adjusted upward in 2.5 mg increments to as much as 10 mg to achieve a response. The esophageal response of achalasia patients to methacholine is evidence that the neuromuscular disorder affects not only the cardia but the distal 2/3 of the esophagus. The part of the swallowing mechanism under voluntary control is seen as normal in these patients. Cinefluorography is indispensable, as the degree of esophageal dilation has an effect on response, and manometric studies alone may yield false-negative results in a grossly dilated, denervated esophagus. Methacholine stimulation serves to distinguish achalasia from other causes of esophageal dilation such as scleroderma, benign peptic stricture, and diffuse esophageal spasm. A positive methacholine response has also been noted in a few patients with infiltrating carcinoma of the esophagus. This is caused by complete destruction of the myenteric plexus to the level of the aortic arch.

4371 PRELIMINARY RESULTS OF LYMPHOGRAPHY OF THE HUMAN STOMACH: A METHOD FOR VISUALIZING GASTRIC LYMPH NODES BY ENDOSCOPIC INJECTION OF LIPIODOL ULTRAFLUID.

(Ger.) Schacht, U.; Junemann, A.; Becker, H. J.; Huth, F.; Moschinski, D.; Palomba, P. P. (Inst. Med. Radiol., Univ. Dusseldorf, Germany). *Dtsch. Med. Wochenschr.* 99(13):616-618, 1974.

Lipiodol Ultrafluid was injected into the gastric submucosa under endoscopic control to visualize gastric lymph nodes in 7 patients with stomach cancer, 8 with stomach ulcers, and 3 with no gastric abnormalities. All diagnoses were confirmed by biopsy and at operation. In all 3 controls the left and right caudal lymph nodes in the stomach, the pancreaticolienal lymph nodes, and the celiac lymph nodes were visualized after 12 hr. The contrast medium remained in the wall of the stomach without reaching the surrounding lymph nodes in 4 of the 8 patients with stomach ulcers, while contrast medium accumulated in the regional lymph nodes in 6 of the 7 patients with stomach cancer. Lymph node metastases were diagnosed histologically in 3 of these 6 patients. Pathological examinations of resected stomachs, performed 2-10 days after lymphography, revealed a moderately acute inflammatory reaction in the submucosa in 1 case and smaller, circumscribed areas of bleeding near the site of injection in 2 cases. No severe inflammation, ulceration, or other side reaction was observed.

4372 THE STRUGGLING ANTRUM: A NEW SIGN OF PERIGASTRIC MALIGNANCY.

(E.) Keller, R. J.; Khilnani, M. T.; Wolf, B. S. (Mount Sinai Hosp., New York, N.Y.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 119(2):300-310, 1973.

Subtle but analyzable changes occur in the appearance of the antrum during filling and emptying whenever a portion of the wall is fixed, particularly as a result of increased infiltration by carcinoma of the pancreas. Abnormalities of distensibility include pseudoloculation and flattening and ridging. Abnormalities demonstrated during the contraction phase include asymmetry and eccentricity, specific alteration of the slopes of the peristaltic wave, fixation, angulation, elevation, and mucosal fold changes. These abnormalities of antral distensibility and motor activity reflect the attempts by the uninvolved portion of the antrum to maintain adequate mechanical function. In the absence of other roentgen findings, the changes may be sufficient to suggest the diagnosis of perigastric tumor. Abnormalities in the peristaltic pattern may also be seen in intrinsic neoplasms of the antrum. Absence of mucosal ulceration or destruction would exclude an intrinsic process.

4373 A METHOD FOR THE DEMONSTRATION OF THE MUCOSAL PATTERN OF THE DUODENAL CAP.

(E.) Kabakian, H. A. (American Univ. Med. Ctr., Beirut,

Lebanon). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 119(2):311-315, 1973.

A technique is described to demonstrate, in the prone position, the mucosal pattern of the duodenal cap which is situated high under the ribs or is obscured by the overlying barium-filled antrum. The patient assumes the prone oblique or lateral position and a pneumatic compression paddle is placed at a distance caudad to the cap. Following deep inspiration, the cap comes to lie over the center of the paddle. The patient is then asked to hold his breath in deep inspiration, while the pneumatic paddle is inflated and the required degree of compression obtained for visualization of the mucosal pattern.

4374 ULCERATIVE AND GRANULOMATOUS COLITIS: VARIATIONS IN OBSERVER INTERPRETATIONS AND IN ROENTGENOGRAPHIC APPEARANCE AS RELATED TO TIME.

(E.) Nelson, J. A.; Margulis, A. R.; Goldberg, H. I.; Fenlon, J. W.; Lawson, T. L.; Amberg, J. R. (Univ. California Sch. Med., San Francisco). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 119(2):369-374, 1973.

Examination by 3 radiologists of 32 roentgenograms of confirmed granulomatous colitis yielded a unanimous correct diagnosis in 9 cases and a unanimous incorrect diagnosis of ulcerative colitis in 5. Three months later the same radiologists were given 32 ulcerative colitis films and 18 of the granulomatous colitis films from the first series. A unanimous correct diagnosis of ulcerative colitis was made in 16 cases, whereas a unanimous correct diagnosis of granulomatous colitis was made in only 6. In 3 cases there was unanimous incorrect diagnosis of ulcerative colitis as granulomatous colitis; in 7 there was unanimous incorrect diagnosis of granulomatous colitis as ulcerative colitis. Unanimous correct readings of granulomatous colitis were most often influenced by findings of terminal ileum disease, right-sided colonic disease, deep ulcers, and fistula. Criteria responsible for both correct and incorrect diagnosis of ulcerative colitis were total or left-sided involvement, rectal disease, shallow ulcers, concentric involvement, and totally contracted colon. Over a period of 1 month to 3 yr, 3 cases of granulomatous colitis showed development of an ulcerative colitis pattern on roentgenograms, but these changes did not persist. In 2 cases of ulcerative colitis there was inconclusive evidence of evolution into granulomatous colitis. These findings emphasize the necessity of basing diagnosis of colitis on all current and previous roentgenographic and pathological data.

4375 FILLING OF LIEBERKUHN'S CRYPTS IN THE COLON DURING CONTRAST EXAMINATIONS: A CONTRIBUTION TO THE DIFFERENTIAL DIAGNOSIS OF COLITIS.

(Ger.) Zwad, H.-D. (Med. Coll., Lubeck, Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 120(3):278-283, 1974.

A survey made of the results of barium contrast examinations of the large intestine in 100 children who were considered to have normal findings showed that filling of Lieberkuhn's crypts occurred in 31. All but one of these children were over 1 yr old. Fine saw-toothed irregularities were observed in the contours of the large intestine when the intestine was half full. These irregularities disappeared completely when the intestine was full. After partial evacuation, the saw-toothed irregularities reappeared. Each one measured about 1 mm with about 10-15/cm intestine. These changes were observed in all parts of the large intestine, but were most common in the descending, transverse, and sigmoid colon. Histories and clinical findings showed no evidence of ulcerative colitis. Proctoscopic findings were normal in all 4 patients examined, as were mucosal biopsies in the 2 patients studied. No signs of inflammation were detected and filling of Lieberkuhn's crypts was not associated with constipation. It is concluded that the filling of Lieberkuhn's crypts is a normal finding in children. In contrast to Lieberkuhn's crypts, the ulcerations visualized in ulcerative colitis are irregular in shape and size and the distance between them varies. Unlike Lieberkuhn's crypts, these ulcers are visualized when the intestine is full.

4376 ARTERIOGRAPHIC DIAGNOSIS OF INTESTINAL ADHESIONS.

(Fr.) Fays, J.; Regent, D.; Donner, J.; Bessot, M.; Treheux, A. (Reg. Hosp. Ctr., Nancy, France). *Ann. Radiol. (Paris)* 17(1):65-70, 1974.

Selective superior mesenteric arteriograms from 30 patients with adhesions of the small intestine are analyzed. The diagnosis was confirmed by laparoscopy (4 cases) or laparotomy (26 cases). Malformations of the intestinal arteries which were observed consisted of (1) curvilinear deformations, most often involving the ileal artery; (2) a "bayonette" course in which the ileal artery followed a zig-zag path showing adhesion of the mesentery and the artery which it contained; (3) a recurrent course found in 3 patients; and (4) a pseudotumoral appearance of the superior mesenteric artery, found in 2 patients. The latter deformation resulted from organized hematomas behind the mesentery with loops of the intestine adhering to the periphery of this inflammatory mass. In the capillary stage adjacent loops of the intestine were clustered together and bound to one another. In later stages the veins were displaced in the same manner as the satellite arteries. A profile view, made in 3 cases, revealed that the distal part of the superior mesenteric artery was adherent to the anterior wall of the aorta and the ileal arteries, which followed a sinusoidal course, were displaced backwards. It is emphasized that these arteriographic features are not specific for intestinal adhesions but may be found in other abdominal lesions in which the mesentery is involved. These include mesenteric cysts, peritoneal carcinomas, common mesentery, hernias, and vascular changes secondary to an enteroplasty.

4377 THE AMYLASE-CREATININE CLEARANCE RATIO. DIAGNOSTIC PARAMETER OR PHYSIOLOGIC PHENOMENON?

(E.) Dreiling, D. A.; Leichtling, J. J.;

anowitz, H. D. (Mt. Sinai Hosp., New York, N.Y.). *m. J. Gastroenterol.* 61(4):290-296, 1974.

nalysis was made of serum amylase, urinary amylase nd derived amylase/creatinine clearance data in 377 atients without pancreatic disease, 177 with acute ancreatitis, 167 with chronic pancreatitis and 52 ith pancreatic cancer. Patients without pancreatic isease were divided in 2 groups, first, normal con-rols, and second, differential diagnostic cases com-rising acute conditions as acute cholecystitis, acute ppendicitis, and perforated duodenal ulcers. These groups presented similar means and similar ranges or all 3 parameters. The limits of normalcy as erived from these 2 groups were serum amylase, 200 g%; urinary amylase, 1,200 mg%; and amylase/ reatinine clearance ratio, 4.0. In acute pancrea-itis patients, the mean values were serum amylase, 52 mg%; urinary amylase, 2,491 mg%; and amylase/ reatinine clearance ratio, 14.5, significantly above he limits. Data for patients with chronic pancrea-itis or pancreatic cancer fell within the range for atients without pancreatic disorder. Thus the deter-ination of amylase in the blood and urine has little iagnostic value in these cases, nor does the calcu-ation of the amylase/creatinine clearance ratio. acroamylasemia was encountered in 8 patients and was haracterized by a high serum amylase, low urinary mylase, and very low, below 1%, amylase/creatinine learance ratio. These data suggest that the simul-aneous determination of serum amylase, urinary amy-ase, and the calculation of the amylase/creatinine atio increased the diagnostic significance of amylase alues.

378 INTRAVENOUS CHOLEGRAPHY AND PERORAL CONTRA-CEPTIVES. A PRELIMINARY REPORT. *(E.)* indgren, P.; Saltzman, G. F.; Zeuchner, E. (Natl. oard Health Welfare, Stockholm, Sweden). *Acta Radiol. Diagn.] (Stockh.)* 15(2):217-224, 1974.

379 ACCURACY OF DIAGNOSTIC TOOLS IN MALIGNANT HEPATIC LESIONS. A COMPARATIVE STUDY USING ERUM TESTS, SCINTISCANNING, AND LAPAROTOMY. *(E.)* lmersjo, O.; Bengmark, S.; Hafstrom, L.; Rosengren, . (Dept. Surg., Roentgenology, Univ. Goteborg, Swe-en). *Am. J. Surg.* 127(6):663-668, 1974.

380 RADIOIMMUNOASSAY OF α-FETOPROTEIN. I. TECH-NIQUE AND SERUM LEVELS IN THE NORMAL ADULT. *E.)* Masseyeff, R.; Bonet, C.; Drouet, J.; Sudaka, .; Lalanne, C. (Sch. Med., Nice, France). *Digestion* 0(1):17-28, 1974.

381 CLINICAL APPLICATION OF ISOAMYLASE ANALYSIS. *(E.)* Berk, J. E.; Fridhandler, L. (Coll. ed., Univ. California, Irvine). *Gastroenterology* 6(4):665, 1974.

382 CARCINOEMBRYONIC ANTIGEN. *(E.)* Darani, M.; Dubin, A.; Villa, F.; Szanto, P.; Steigmann, . (Cook County Hosp., Chicago, Ill.). *Gastroenterol-gy* 66(4):680, 1974.

4383 VALUE OF COLONOSCOPY IN THE INVESTIGATION OF INFLAMMATORY BOWEL DISEASE. *(E.)* Das, K. M.; Farid, T.; Berkowitz, J. M. (Nassau County Med. Ctr., East Meadow, N.Y.). *Gastroenterology* 66(4):681, 1974.

4384 HEPATITIS B ANTIBODY: DETECTION WITH A SOLID PHASE RIA AND QUANTIFICATION IN HUMAN GAMMA GLOBULIN. *(E.)* Efrusy, M. E.; Ginsberg, A. L. (George Washington Univ. Med. Ctr., Washington, D.C.). *Gastroenterology* 66(4):688, 1974.

4385 CLINICAL VALUE OF ESOPHAGEAL MANOMETRY. *(E.)* Espiritu, C. R.; Camara, E.; Van Devere, G. (Mt. Sinai Med. Ctr., Miami Beach, Fla.). *Gastroenterology* 66(4):688, 1974.

4386 THE METHEMALBUMIN TEST FOR HEMORRHAGIC PANCREATITIS HAS COME OF AGE. *(E.)* Geokas, M. C.; Rinderknecht, H. (Sepulveda VA Hosp., Los Angeles, Calif.). *Gastroenterology* 66(4):696, 1974.

4387 CALCIUM BINDING PROTEIN IN HUMAN DUODENAL BIOPSIES. *(E.)* Gleason, W. A.; Alpers, D. H. (Washington Univ. Sch. Med., St. Louis, Mo.). *Gastroenterology* 66(4):699, 1974.

4388 RADIOIMMUNOASSAY (RIA) OF CHOLECYSTOKININ-PANCREOZYMIN (CCK-PZ) IN HUMAN SERUM. *(E.)* Go, V. L. W.; Cataland, S.; Reilly, W. (Mayo Clin., Rochester, Minn.). *Gastroenterology* 66(4):700, 1974.

4389 MEASUREMENT OF CHOLECYSTOKININ-PANCREOZYMIN LEVELS IN PERIPHERAL VENOUS BLOOD IN MAN. *(E.)* Harvey, R. F.; Mathur, M. S.; Dowsett, L.; Read, A. E. (Univ. Dept. Med., Bristol, England). *Gastroenterology* 66(4):707, 1974.

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See also 4142, 4388, 4475, 4571, 4619, 4636, 4638, 4747, 4876, 4888, 4903, 4939, 4962, 4972.

GASTROINTESTINAL DISEASES

ESOPHAGUS

4468 SPECIFIC TUBERCULAR ESOPHAGITIS. *(Ger.)* Heuck, F. (Katharinen Hosp., Stuttgart, Germany). *Radiologe* 13(9):377-379, 1973.

Chest x-rays from an 87-yr-old man showed decreased esophageal peristalsis, irregular contours of the wall in the middle to caudal part of the esophagus, an irregularly shaped ulcer, and gastroesophageal reflux. A diagnosis of reflux esophagitis was established on the basis of these findings. In addition to senile emphysema, partially calcified lymph nodes were present in the pulmonary hili and poorly defined foci were observed in the upper left field. The patient died suddenly of heart and circulatory failure 2 weeks later. Autopsy showed the presence of old tubercular changes in the left upper lobe of the lung, granulation and ulceration of the caudal part of the esophagus, and yellowish or gray nodules with caseous necrotic masses in peripheral regions. Histological examination revealed tubercular changes with epitheloid cells, granulations, and an increase in scar tissue. No perforations were present. The absence of severe tubercular changes near the esophagus suggests that preexisting miliary tuberculosis had been reactivated. It is concluded that a differential diagnosis of inflammatory diseases of the esophagus cannot be established on radiological evidence alone. Esophagoscopy, histological examination of biopsies taken from different parts of the region involved, or the bacteriological detection of tuberculosis bacilli are needed for the diagnosis of tuberculous esophagitis.

4469 ESOPHAGEAL VARICES IN AGNOGENIC MYELOID METAPLASIA: DISAPPEARANCE AFTER SPLENECTOMY. A CASE REPORT. *(E.)* Sullivan, A.; Rheinlander, H.; Weintraub, L. R. (Univ. Hosp., Boston, Mass.). *Gastroenterology* 66(9):429-432, 1974.

A 65-yr-old man with massive splenomegaly secondary to agnogenic myelofibrosis and extramedullary myeloid metaplasia was found to have esophageal varices. No intra- or extrahepatic obstruction to portal blood flow was present. Splenectomy immediately reduced portal venous pressure from 34 to 19 cm of saline, and 2 months postoperatively no varices were demonstrable by barium swallow. Portal hypertension in certain cases of agnogenic myelofibrosis and extramedullary myeloid metaplasia may be mainly due to increased portal flow rather than increased resistance, and these individuals may benefit from splenectomy alone. In this patient polycythemia, leukocytosis, and thrombocythemia occurred post-splenectomy despite the extensive myelofibrosis noted at biopsy. This is compatible with the concept that myelofibrosis begins in the central bones of the body and is associated with initial conversion of the distal fatty marrow to panhyperplasia.

4470 EFFECT OF INTRAVENOUS METOCHLOPRAMIDE ON THE INCOMPETENT LOWER ESOPHAGEAL SPHINCTER. *(E.)* Guelrud, M. (Univ. Hosp., Caracas, Venezuela). *Am. J. Gastroenterol.* 61(2):119-124, 1974.

The effect of metoclopramide (10 mg i.v.) on the esophagus and lower esophageal sphincter pressure was studied manometrically in 23 patients: 12 without esophageal symptoms and without hiatus hernia and 11 with symptoms of gastroesophageal reflux and hiatus hernia. Metoclopramide increased the resting lower esophageal sphincter pressure in the reflux patients from a mean of 4.1 to 23.5 mm Hg. Metoclopramide also increased the amplitude and duration of pressure peristaltic waves in the lower esophagus. Atropine (0.5 mg i.v.) blocked this effect suggesting a final cholinergic pathway. It is concluded that metoclopramide would be a valuable addition to drug therapy for gastroesophageal reflux.

4471 THE SURGICAL TREATMENT OF REFLUX OESOPHAGITIS: RESULTS OF SURGICAL REPAIR OVER A 12-YEAR PERIOD. *(E.)* Wilson, M. G.; Bailey, I. S.; Penry, A. B. (Southmead Hosp., Bristol, England). *Br. J. Surg.* 61(3):193-200, 1974.

The results of surgical treatment of 81 cases of reflux esophagitis are reported. A simple repair (i.e., repair of the hiatus and reconstruction of the esophagogastric angle) was performed on 44 patients between 1958 and 1966, while 37 patients treated from 1966 to 1970 had fundoplications. About 1/2 the cases with simple repairs also had vagotomy and pyloroplasty, and some had cholecystectomy for associated gallstones. Comparing simple repair with fundoplication, 92% of the cases in both groups were good clinically, but radiologically 77% of the fundoplications were good compared with 60% of the simple repairs. Two of the simple repairs have required further surgery for recurrent esophagitis. There has been no recurrent esophagitis in the fundoplication group, but dysphagia has been a problem requiring reoperation in 1 case and repeated bouginage in 3 others. Postprandial discomfort due to difficulty in belching occurs. Vagotomy has not had a beneficial effect: the group without vagotomy was superior clinically and radiologically. Because of the complications of fundoplication, simple repair has been resumed with two modifications. The first is to improve the flap valve by attaching the fundus of the stomach to the whole anterior aspect of the abdominal esophagus. The second is to place a few stitches between the lesser curve of the stomach below the cardia and the preaortic fascia.

4472 HEALING OF CIRCULAR ESOPHAGEAL MUCOSAL DEFECTS: AN EXPERIMENTAL STUDY IN THE PIGLET. *(E.)* Kornfalt, S. A.; Okmian, L.; Jonsson, N. (Dept. Pediatr. Surg., Univ. Lund, Sweden). *Z. Kinderchir.* 13(2):184-197, 1973.

Circular mucosal defects were created in the esophagus of Swedish Landrace piglets (aged 2-3 weeks) by transection or excision of the mucosa. In one group of piglets with transected mucosa, an intraluminal tube was left in the esophagus running through the area of division. X-ray examinations, macrophotography, and microscopy revealed that mucosal defects invariably healed with complete occlusion of the lumen within 4 weeks. The predominant process in the stricture formation resembled wound contraction in full thickness wounds. Occlusion of the lumen could be prevented by an indwelling esophageal tube kept in place for more than 14 days; true regeneration of the epithelium and total cover of the mucosal defect was confirmed in all animals with tubes in place for 14-34 days. These findings support the importance of exact mucosal approximation in esophageal anastomoses. The use of a wide trans-anastomotic tube is recommended in cases where mucosal separation can be expected.

4473 THE INFLUENCE OF THE LOWER OESOPHAGEAL SPHINCTER PRESSURE ON THE OUTCOME OF HIATUS HERNIA REPAIR. *(E.)* Brennan, T. G.; Trindade, L. M.; Rozycki, Z. J.; Giles, G. R. (Leeds (St. James's Univ. Hosp., England). *Br. J. Surg.* 61(3):201-205, 1974.

Of 36 patients examined 6 months to 3 yr after simple repair of hiatus hernia, 12 (1/3) had persistent symptoms consisting of heartburn, reflux, dysphagia, vomiting, or dyspepsia. The symptoms were relatively mild in 4 cases and only 1 had severe symptoms due to gastroesophageal reflux. Persistence of symptoms could not be correlated with radiological reflux or reduced lower esophageal sphincter pressure. Radiological reflux was shown in 3 of 24 asymptomatic patients, while only 1 symptomatic patient had recurrent hernia. Sphincter resting pressures were below 10 mm Hg in 8 patients, all without reflux, including 4 asymptomatic patients.

4474 ESOPHAGEAL FUNCTION IN ELDERLY MEN: A NEW LOOK AT "PRESBYESOPHAGUS." *(E.)* Hollis, J. B.; Castell, D. O. (U.S. Naval Hosp., Philadelphia, Pa.). *Ann. Intern. Med.* 80(3):371-374, 1974.

Esophageal motility was studied in 21 nonhospitalized elderly men (aged 70-87 yr) and in 11 control subjects (aged 19-27 yr), all without neurological disease or diabetes. Esophageal function was studied basally and after administration of edrophonium chloride (80 µg/kg i.v.). For control subjects mean basal and postinjection amplitudes were significantly greater than those for aged subjects, with a marked decline in amplitude in subjects more than 80 yr old. In contrast to the decreased amplitude in 80-yr-old men, the propogation of peristaltic waves, as measured by speed, duration, and onset of contraction after a swallow, was similar for all groups and responded similarly to edrophonium chloride. No increase in abnormal spontaneous motility was noted in the elderly men. These findings suggest a weakening in esophageal smooth muscle with an intact nervous pathway. Disordered motility in elderly persons is most likely caused by disease, rather than by aging. It is suggested that presbyesophagus needs to be redefined.

4475 THE PROCESS OF DEGLUTITION WITH ACID BARIUM: A NEW KIND OF RADIOLOGICAL TEST IN PATIENTS WITH REFLUX DISORDERS. *(Ger.)* Donner, M. (Johns Hopkins Med. Inst., Baltimore, Md.). *Radiologe* 13(9):372-376, 1973.

A new radiological technique is described for the diagnosis of gastroesophageal reflux. While in a prone position and tilted 45° to the right, patients are given a neutral barium suspension (pH 6-7) to swallow. This is followed by an acid suspension of barium (pH 1.6-1.7), about 30 ml of an antacid, and a neutral barium suspension again. Of 278 patients with symptoms of gastroesophageal reflux, 236 (85%) developed spastic contractions of the esophagus lasting 20-30 sec after swallowing the acid barium suspension. Another 35 of these patients (12.6%) developed severe esophageal spasms after swallowing neutral barium suspensions. Only 7 of the 278 patients with symptoms of reflux failed to develop esophageal spasms after administration of barium suspensions. Gastroesophageal reflux was demonstrated in 169 of these 278 patients and 180 had hiatus hernia. Of 80 symptomatic patients, only 3 had positive tests with acid barium suspensions. Hiatus hernia was diagnosed in 14 of these 80 controls.

4476 USE OF METHOTREXATE AND TELEGAMMATHERAPY IN ESOPHAGEAL CANCER. *(Rus.)* Kusherbaev, S. K.; Dement'eva, N. I.; Zhangarashev, K. S.; Tsoi, A. I.; Balmukhanov, S. B. (no affil.). *Vopr. Onkol.* 20(4):23-28, 1974.

4477 THYMIDINE INCORPORATION IN ESOPHAGEAL WOUNDS OF ZINC-DEFICIENT RATS. *(E.)* MacMahon, R. A.; Cussen, L. J.; McDermott, F. T.; James, B. E. (Dept. Pediatr., Surg., Monash Univ., Melbourne, Australia). *Surgery* 75(5):660-663, 1974.

4478 GASTRIC COMPLICATIONS ASSOCIATED WITH PARAESOPHAGEAL HERNIATION. *(E.)* Willwerth, B. M. (Pennsylvania State Univ. Coll. Med., Hershey). *Am. Surg.* 40(6):366-369, 1974.

4479 TRANSFIBERSCOPIC REMOVAL OF ESOPHAGEAL POLYPS. *(E.)* Robinson, A. S.; Sommer, D. A.; Levinson, M. (Univ. Miami Sch. Med., Fla.). *Am. J. Gastroenterol.* 61(4):297-300, 1974.

4480 DIFFUSE ESOPHAGEAL SPASM: A DISCRETE CLINICAL ENTITY. *(E.)* Wynne, D. F.; Gelfand, M. D. (Virginia Mason Hosp., Seattle, Wash.). *Bull. Mason Clin.* 28(1):17-24, 1974.

4481 PATHOGENESIS OF ACID ESOPHAGITIS. *(E.)* Chung, R. S. K.; Magri, J.; Shirazi, S.; DenBesten, L. (Univ. Iowa Coll. Med., Iowa City). *Gastroenterology* 66(4):675, 1974.

4482 DYNAMICS OF THE LOWER ESOPHAGEAL HIGH PRESSURE ZONE BEFORE AND AFTER BELSEY FUNDOPLASTY. *(E.)* Farrell, R. L.; Higgs, R. H.;

Castell, D. O. (U.S. Naval Hosp., Philadelphia, Pa.). *Gastroenterology* 66(4):690, 1974.

4483 PHYSIOLOGICAL EFFECTS OF SURGICAL REPOSITIONING OF THE LOWER ESOPHAGEAL SPHINCTER. *(E.)* Katz, L. A.; Maas, L. C.; Vastola, D. L.; Kaunitz, V. H. (Dept. Med., State Univ. New York, Buffalo). *Gastroenterology* 66(4):720, 1974.

4484 COMPARATIVE EFFECTS OF METOCLOPRAMIDE AND URECHOLINE ON LOWER ESOPHAGEAL SPHINCTER PRESSURE IN REFLUX PATIENTS. *(E.)* McCallum, R.; Kline, M.; Curry, N.; Sturdevant, R. (VA Wadsworth Hosp. Ctr., Los Angeles, Calif.). *Gastroenterology* 66(4):742, 1974.

4485 A COMPREHENSIVE INVESTIGATION OF PATIENTS WITH SYMPTOMS OF GASTROESOPHAGEAL REFLUX (GER). *(E.)* Miller, W. N.; Hogan, W. J.; Dodds, W. J.; Arnderfer, R. C.; Stef, J. J. (Med. Coll. Wisconsin, Milwaukee). *Gastroenterology* 66(4):747, 1974.

4486 SERUM GASTRIN LEVELS IN REFLUX ESOPHAGITIS. *(E.)* Stremple, J. F. (Dept. Surg., Univ. Pittsburgh, Pa.). *Gastroenterology* 66(4):785, 1974.

4487 PERISTALTIC FORCE AND VELOCITY - CLUES IN THE EVALUATION OF DYSPHAGIA OF MOTOR ORIGIN. *(E.)* Wagner, J. R.; Pope, II, C. E. (VA Hosp., Seattle, Wash.). *Gastroenterology* 66(4):793, 1974.

4488 SYMPTOMATIC GASTROESOPHAGEAL REFLUX - FAILURE TO RESPOND TO MEDICAL THERAPY. *(E.)* Grossmann, A. E.; Klotz, A. P.; Rhodes, J. B. (Kansas Univ. Med. Sch., Kansas City). *Gastroenterology* 66(4):801, 1974.

4489 ADENOCARCINOMA IN SITU OF THE ESOPHAGUS ARISING IN COLUMNAR EPITHELIUM. *(E.)* Belladonna, J. A.; Bains, M. S.; Hajdu, S.; Melamed, M.; Winawer, S. (Memorial Sloan-Kettering Cancer Ctr., New York, N.Y.). *Gastroenterology* 66(4):803, 1974.

4490 AN END POINT FOR PNEUMATIC DILATATION OF ACHALASIA. *(E.)* Cohen, N. N. (Mercy Catholic Med. Ctr., Philadelphia, Pa.). *Gastroenterology* 66(4):809, 1974.

4491 ACUTE ESOPHAGEAL FAILURE. *(E.)* Gelfand, M. D. (Mason Clin., Seattle, Wash.). *Gastroenterology* 66(4):813, 1974.

4492 SURGICAL TREATMENT OF CARCINOMA OF THE OESOPHAGUS. *(E.)* Cleland, W. P. (Hammersmith Hosp., London, England). *Postgrad. Med. J.* 50(582):229-230, 1974.

4493 DIAGNOSTIC VALUE OF DYSPHAGIA: DYSPHAGIA RESULTING FROM PROCESSES IN ADJACENT ORGANS (MEDIASTINUM, LUNG, BRONCHI, HEART) AND DYSPHAGIA ASSOCIATED WITH OTHER DEFICIENCY, NEUROLOGICAL, AND TOXIC DISEASES. *(Sp.)* Triadu, I. (Pujol and Brull Clin., Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 42(5):503-528, 1974.

See also 4365, 4370, 4404, 4408, 4443, 4448, 4449, 4456, 4498, 4523, 4681, 4728, 4763, 4819, 4847, 4858, 4860, 4910.

STOMACH

4494 STRESS INDUCED GASTRIC LESIONS IN SPONTANEOUSLY HYPERTENSIVE RATS: INVOLVEMENT OF AUTONOMIC NEUROTRANSMITTER SUBSTANCES. *(E.)* Goldenberg, M. M. (Norwich Pharmacal Co., N.Y.). *Am. J. Dig. Dis.* 19(4):353-360, 1974.

The roles of the parasympathetic and sympathetic nerves in the induction of gastric hemorrhagic lesions induced by cold-plus-restraint stress were studied in spontaneously hypertensive (SHR) rats. After bilateral vagotomy or reserpine treatment (1 mg/kg, i.p.), partial reduction in the incidence and severity (per stomach) of gastric lesions was observed. Vagotomy plus reserpine, levodopa, or levodopa plus reserpine significantly decreased the number and incidence of lesions. Nonhemorrhagic gastric ulcers developed in SHR after vagotomy or vagotomy plus reserpine. In normotensive Wistar rats, bilateral vagotomy and levodopa failed to affect stress-induced lesions. Reserpine increased the number of frequency of lesions, while vagotomy and levodopa abolished the responses to reserpine. Nonhemorrhagic gastric ulcers were not seen in normotensive rats. The data indicate that acetylcholine and norepinephrine, released from the parasympathetic and sympathetic nerves, respectively, play paramount roles in the induction of hemorrhagic gastric lesions by cold-plus-restrain stress in SHR.

4495 PREVENTION OF ANTIINFLAMMATORY DRUG-INDUCED GASTRIC LESIONS IN RATS BY ABBOTT-29590. *(E.)* Dodge, P. W.; Brodie, D. A.; Young, P. R.; Krause, R. A.; Tekeli, S. (Abbott Labs., Chicago, Ill.). *Am. J. Dig. Dis.* 19(5):449-457, 1974.

Abbott-29590[2,3-dihydro-1H-pyridino-(2,3-b)(1,4)-thiazine-2-one], an antiinflammatory compound with antipyretic and analgesic activity in test animals, did not produce any gastric lesions in the rat after p.o. administration of doses up to 256 mg/kg. In contrast, gastric lesions were produced by p.o. administration of aspirin, indomethacin, and phenylbutazone. The ED$_{95}$ values were 88, 13, and 260 mg/kg, resp. Pretreatment with Abbott-29590 prevented gastric damage induced by aspirin and indomethacin, but not ulceration induced by phenylbutazone. The ED$_{50}$ values of Abbott-29590 for preventing gastric lesions induced by aspirin, Abbott-29590, and exogenous 0.1 N HCl suggest that Abbott-29590 was additive with aspirin in its antiinflammatory activity and simultaneously blocked gastric lesions produced by aspirin. The antiinflammatory activity of indomethacin in the carrageenin rat paw edema test was not altered by 30 min pretreatment with Abbott-29590, while phenylbutazone and Abbott 29590 were additive in antiinflammatory activity. Studies of gastric lesions produced by a combination of aspirin, Abbott-29590, and exogenous 0.1 N HCl suggest that Abbott-29590 may tighten the gastric mucosal barrier.

4496 TOPOGRAPHY AND FINE STRUCTURE OF ACUTE FUNDIC MUCOSAL EROSIONS IN THE RAT. *(E.)*

Morris, G. P.; Harding, R. K. (Dept. Biol., Queen's Univ., Kingston, Canada). *Lab. Invest.* 30(5):639-646, 1974.

Acute focal mucosal lesions developed in rats after exposure to a response-avoidance schedule of 3-12 hr duration. The topography of the fundic mucosa of experimental, yoked control, and normal animals was compared in the scanning electron microscope. Transmission electron microscopy was employed to substantiate and clarify the results of these topographic studies. The luminal surfaces of normal surface epithelial cells are relatively flat, polygonal, and fit closely together. Occasionally, concentrations of shallow apical erosions were seen in normal animals. Apical swelling of surface epithelial cells was extensive in experimental animals, and apical erosions were more numerous, deeper, and less uniform in outline than in normal controls. This apical swelling was accompanied by changes in the intracellular distributions of mucous granules and by separation of lateral cell surfaces, except in the region of the junctional complex. Cells bordering mucosal lesions showed extensive lateral and basal erosion, although their luminal surfaces were often intact. It is suggested that, after an initial surface breakthrough involving a small number of cells, mucosal lesions increase in area, primarily by erosion of the more vulnerable lateral and basal cell surfaces.

4497 JAPANESE GASTRIC CANCER. POTENTIALLY CARCINOGENIC SILICATES (TALC) FROM RICE.

(E.) Matsudo, H.; Hodgkin, N. M.; Tanaka, A. (St. Joseph Med. Ctr., Burbank, Calif.). *Arch. Pathol.* 97(6):366-368, 1974.

Consumption of rice coated with asbestos-contaminated talc has been suggested as the cause of the high incidence of gastric cancer among Japanese. Formalin-fixed tumor tissue from 7 Japanese individuals with gastric cancer were processed for light and electron microscopy. Examination of the 7 gastric malignant neoplasms under the light microscope showed each to be a primary, fairly well-differentiated, infiltrating gastric adenocarcinoma, with varying degrees of mucous secretory activity, ulceration, desmoplasia and inflammation. Examination by polarized light of hematoxylin-eosin-stained slides revealed talc (10-36 μ in diameter) and crystalline spicules (0.8 x 6.4 μ to 4.0 x 16.0 μ) in only 1 of the 7 specimens. When examined with the transmission electron microscope, however, crystalline particles (about 0.5 μ or smaller) were observed in 6 of the 7 tumor specimens. Nothing was found in the other specimen. Scanning electron microscopy of a precipitate from rice wash water and washed rice disclosed identical crystals. Elemental x-ray analyses of these crystals showed that they were composed of magnesium and silicon and are probably talc. Since the magnesium silicate crystals of asbestos are definitely carcinogenic, the silicates found here should be considered potentially carcinogenic and the coating of rice with talc should be carefully reevaluated.

4498 PYLORIC INCOMPETENCE IN PATIENTS WITH SYMPTOMATIC GASTROESOPHAGEAL REFLUX.

(E.) Kaye, M. D.; Showalter, J. P. (Univ. Colorado Med. Ctr., Denver). *J. Lab. Clin. Med.* 83(2):198-206, 1974.

Duodenogastric regurgitation was measured in 10 patients with symptomatic gastroesophageal reflux and in 10 normal age- and sex-matched controls by serial determinations of the bile salt concentration in juice aspirated from the proximal portion of the stomach. Sliding hiatus hernias were radiologically diagnosed in 9 and distal esophageal stricture in 5. Esophagoscopy revealed manifest esophagitis with a friable mucosa and/or erosions in 7 of the 8 patients examined. The measurements were made over a 1-hr period under basal conditions and over a 4-hr period after ingestion of a standard liquid meal. The gastric bile salt concentrations were similar in the 2 groups of subjects under basal conditions, but after the meal they were consistently and significantly higher in the patients than in the controls. The peak bile salt concentrations in 6 of the patients exceeded the highest control value (0.89 + 0.24 compared with 0.21 + 0.05 mg/ml). The rate of decline in the gastric concentration of polyethylene glycol (included in the liquid meal) was similar in the 2 groups. These results indicate that regurgitation of the duodenal contents into the stomach is excessive in patients with symptomatic gastroesophageal reflux. One or more components of the postprandial duodenal juice may contribute to the development of esophagitis in patients with gastroesophageal reflux.

4499 EPIDEMIOLOGICAL INVESTIGATION ON STOMACH CANCER MORTALITY IN CHILEANS: ASSOCIATION WITH NITRATE FERTILIZER. *(E.)*

Zaldivar, R.; Robinson, H. (Univ. Tennessee Coll. Med., Memphis). *Z. Krebsforsch.* 80(4):289-295, 1973.

A multivariate statistical analysis was made of the relative contributions of exposure to fertilizer, rainfall and latitude to the variability of gastric cancer mortality rates in the Chilean Provinces. The method used was stepwise multiple regression. Results indicated that the major factor was exposure to sodium nitrate used as fertilizer. Associations between gastric cancer death rates on the one hand and proportions of farmers and farmer exposure to sodium nitrate on the other hand indicate that farmer deaths influenced the death rates by provinces. Of 1675 male workers in actual contact with the soil, farmers (31.2%) and miners (18.7%) accounted for 49.4% of all male deaths from stomach cancer.

4500 RADIOIMMUNOASSAY OF GROUP I PEPSINOGENS IN SERUM. *(E.)* Samloff, I. M.; Liebman, W. M. (Harbor Gen. Hosp., Torrance, Calif.). *Gastroenterology* 66(4):494-502, 1974.

A radioimmunoassay for the group I pepsinogens (PG I) in human serum has been developed. The standard PG I was isolated from human urine, and, when labeled with ^{125}I, was shown to be immunochemically homogeneous by radioimmunoelectrophoresis and radioimmunoprecipitation. The antiserum was obtained from rabbits immunized with partially purified PG I. Standard PG I and serum gave parallel inhibition curves against the labeled antigen. The sensitivity of the assay was on the order of 2 ng/ml serum. The reproducibility was demonstrated by the finding that of 15 pairs of determinations carried out 2 months apart, 13 differed from one another by less than 5% of the mean value. PG I in serum was stable for at least 7 months at -20 C. The mean serum PG I levels in 69 healthy control subjects and 71 hospitalized control patients were 102.7 ± 32.5 and 96.2 ± 41.9 ng/ml. In 14 patients with pernicious anemia and in 12 patients with total gastrectomy, the mean serum PG I values were 10.2 ± 6.4 and 3.8 ± 2.9 ng/ml, respectively. In five patients with Zollinger-Ellison syndrome, the mean level was 456.1 ± 187.3 ng/ml. These data suggest that the extremes of gastric secretory function, namely, pernicious anemia and Zollinger-Ellison syndrome, are characterized, resp., by low and high levels of serum group I pepsinogens.

4501 SMALL-INTESTINAL FUNCTION IN VITAMIN B_{12} DEFICIENCY. *(E.)* Lindenbaum, J.; Pezzimenti, J. F.; Shea, N. (Harlem Hosp. Ctr., New York, N.Y.). *Ann. Intern. Med.* 80(3):326-331, 1974.

Intestinal function was studied in 28 patients with untreated pernicious anemia and no clinically apparent intestinal disease. Xylose absorption was impaired in 29% of these patients; fat, in 9%; and vitamin B_{12} given i.m. with intrinsic factor, in 75%. Xylose malabsorption was more common in patients with severe hematologic depression; it was generally reversible within 2-3 weeks after institution of vitamin B_{12} therapy. In most patients absorption of radioactive cyanocobalamin returned to normal within 1-8 weeks. In 4 patients cyanocobalamin absorption remained subnormal after 4-41 months of vitamin repletion. In 2 of these patients a 5-day course of p.o. tetracycline rapidly reversed the vitamin B_{12} malabsorption. The remaining 2 patients had high titers of serum antibodies to intrinsic factor (1:128 and 1:512). Reversible impairment of intestinal absorptive capacity is commonly associated with vitamin B_{12} deficiency. Abnormalities shown in absorption tests done within 2 months of initiating therapy in patients with pernicious anemia do not necessarily reflect primary small-intestinal disease.

4502 CLINICAL AND MORPHOLOGICAL STUDIES OF GIANT HYPERTROPHIC GASTRITIS (MENETRIER'S DISEASE). *(E.)* Raotama, H.; Angervall, L.; Dahl, I.; Dotevall, G. (Sahlgren's Hosp., Gothenburg, Sweden). *Acta Med. Scand.* 195(4):247-252, 1974.

4503 CELL RENEWAL IN INFLAMMATORY CHANGES OF THE GASTRIC MUCOSA. *(Ger.)* Castrup, H. J.; Fuchs, K. (Clin. Polyclin. Gen. Surg., Univ. Gottingen, Germany). *Dtsch. Med. Wochenschr.* 99(17):892-895, 1974.

4504 ON EPIDEMIOLOGY OF GASTRIC CANCER IN DAGESTAN. *(Rus.)* Dalgat, D. M.; Aliev, R. G.; Giraev, G. I.; Abdulgamidov, M. M. (Dagestan Med. Inst., Pedagogical Inst., Makhachkala, USSR). *Vopr. Onkol.* 20(2):76-82, 1974.

4505 PATTERNS OF GASTRITIS IN CHRONIC ALCOHOLICS. *(E.)* Pitchumoni, C. S.; Lopes, J. D.; Glass, G. B. J. (New York Med. Coll., N.Y.). *Gastroenterology* 66(4):759, 1974.

4506 EMOTION-RELATED GASTRITIS. *(E.)* Goldberg, S. J.; Smith, C. L.; Connell, A. M. (Univ. Cincinnati Med. Ctr., Ohio). *Gastroenterology* 66 (4):813, 1974.

4507 ENDOSCOPIC ENZYMATIC DISSOLUTION OF POSTGASTRECTOMY PHYTOBEZOARS. *(E.)* Davis, Jr., R. C.; Faruqui, A. M. A. (no affil.). *Gastroenterology* 66(4):810, 1974.

4508 ENDOSCOPIC APPEARANCE OF ATHEROMATOUS EMBOLIZATION TO THE STOMACH: AN UNUSUAL CASE OF CHRONIC GASTROINTESTINAL BLEEDING. *(E.)* Bourdages, R.; Beck, I. T.; DaCosta, L. R.; Prentice, R. S.; Paloschi, G. (Hotel Dieu, Kingston, Canada). *Gastroenterology* 66(4):806, 1974.

4509 DOUBLE PYLORUS. *(E.)* Bonanno, C. A.; Meyers, D. (St. Vincent's Hosp., New York, N.Y.). *Gastroenterology* 66(4):804, 1974.

4510 GASTRIC INFARCTION - A COMPLICATION OF SELECTIVE VASOPRESSIN INFUSION FOR CONTROL OF

HEMORRHAGE. *(E.)* Alves, M.; Patel, V.; Douglas, E.; Deutsch, E. (Carney Hosp., Md.). *Gastroenterology* 66(4):802, 1974.

4511 GASTRIC MUCOSAL RESPONSE TO ETHANOL - A GASTROSCOPIC AND HISTOLOGICAL STUDY. *(E.)* Dinoso, V. P.; Lorber, S. H. (Temple Univ. Health Sci. Ctr., Philadelphia, Pa.). *Gastroenterology* 66(4):810, 1974.

4512 BILE REFLUX GASTRITIS: EXPERIMENTAL OBSERVATIONS ON EFFECTS OF CHOLESTYRAMINE OR ROUX-EN-Y GASTROENTEROSOMY. *(E.)* Scudamore, H. H.; Eckstam, E. E. (Monroe Clin., Wis.). *Gastroenterology* 66(4):775, 1974.

4513 POSTOPERATIVE DUODENOGASTRIC REFLUX: A CAUSE OF GASTRITIS AND SYMPTOMS. *(E.)* Keighley, M. R. B.; Asquith, P.; Alexander-Williams, J.; Thompson, J. C. (Gen. Hosp., Birmingham, England). *Gastroenterology* 66(4):722, 1974.

4514 RELATIONSHIP OF SERUM GASTRIN AND LOWER ESOPHAGEAL SPHINCTER PRESSURE IN NORMALS AND PATIENTS WITH ANTRECTOMY. *(E.)* Morris, D. W.; Schoen, H.; Brooks, F. P.; Cohen, S. (Univ. Pennsylvania Hosp., Philadelphia). *Gastroenterology* 66(4):750, 1974.

4515 POSTOPERATIVE HEMORRHAGIC GASTRITIS: CLINICAL PREDICTION OF THIS COMPLICATION AND INFLUENCE OF THE PROGNOSIS. *(E.)* Maillard, J. N.; Montariol, T. F.; Rodary, M. (Louis Mourier Hosp., Colombes, France). *Arch. Fr. Mal. App. Dig.* 63(2):97-101, 1974.

4516 DIFFERENCES IN CELL SURFACE PROTEINS OF GUT ADENOCARCINOMA AND NORMAL TISSUES. *(E.)* Baur, S.; Spaulding, R. M. (Stanford Med. Sch., Calif.). *Gastroenterology* 66(4):662, 1974.

4517 THE ANTIULCER AND AUTONOMIC PHARMACOLOGY OF PYRIDYL-2-THIOACETAMIDE (CMN 131). *(E.)* Pascaud, X. B.; Devys, M. M.; Errard, D. J. (Science Union and Co., Suresnes, France). *Am. J. Dig. Dis.* 19(6):516-524, 1974.

4518 EFFECT OF LOST PANCREATIC JUICE ON GASTRIC ACID AND PEPTIC ULCER. *(E.)* Elliot, D. W. (VA Hosp., Pittsburgh, Pa.). *Am. J. Surg.* 127(6):658, 1974.

4519 REFLECTIONS ON THE GASTRIC LOCALISATION OF HODGKIN'S DISEASE. *(E.)* Meyer, C.; Otteni, F.; Oberling, F.; Hollender, L. F. (Hosp. Ctr., Univ. Strasbourg, France). *Chir. Gastroenterol.* 7(4):460-469, 1973.

4520 A CO-OPERATIVE INTERNATIONAL STUDY OF GASTRIC CANCER. *(E.)* Lundh, G.; Burn, J. I.; Kolig, G.; Richard, C. A.; Thomson, J. W. W.; Van Elk, P. J.; Oszacki, J. (Serafimer Hosp., Stockholm, Sweden). *Ann. R. Coll. Surg. Engl.* 54(5):219-228, 1974.

4521 THE DISTINCTION BETWEEN GASTRIC ULCERATION AND CARCINOMA OF THE STOMACH. VALUE OF THE ERYTHROCYTE SEDIMENTATION RATE AND THE MAXIMAL ACID OUTPUT. *(E.)* Bock, O. A. A.; Boyd, I. H. (Dept. Med., Radiol., Univ. Stellenbosch, South Africa). *S. Afr. Med. J.* 47(28):1259-1260, 1973.

4522 POSTOPERATIVE ALKALINE REFLUX GASTRITIS. *(E.)* Bushkin, F. L.; Wickbom, G.; DeFord, J. W.; Woodward, E. R. (Coll. Med., Univ. Florida, Gainesville). *Surg. Gynecol. Obstet.* 138(6):933-939, 1974.

See also 4371, 4372, 4385, 4394, 4396, 4401, 4404, 4408, 4417, 4420, 4434, 4439, 4448, 4452, 4456, 4460, 4466, 4478, 4528, 4544, 4556, 4575, 4656, 4662, 4703, 4915.

STOMACH

Peptic Ulcers

4523 GASTRIC MUCOSAL pH. *(E.)* Earlam, R. J. (London Hosp., England). *Br. J. Surg.* 61(3):185-188, 1974.

The intragastric mucosal pH was measured routinely during the course of esophageal manometry in 263 hospital patients. The mean pH of 117 male patients with duodenal ulceration was 1.3 ± 0.3. Seventeen patients with gastric ulceration had a mean pH of 1.7 ± 0.3, and 19 patients with hiatal herniation had a mean pH of 1.6 ± 0.4. The gastric ulcer patients had a lower mean pH than 8 patients with gastric carcinoma (2.3 ± 0.9). The lowest pH values among the duodenal patients were changed by truncal vagotomy (37 patients) to 1.3 ± 0.8 and by Polya partial gastrectomy (25 patients) to 3.2 ± 1.8. If a stomal ulcer was present after partial gastrectomy, the pH was 1.1; this changed to above 1.9 after vagotomy.

4524 HISTOLOGIC STUDY OF GASTRIC LESIONS IN FOOD-RESTRICTED RATS (38012). *(E.)*

Pintar, K.; Schulte, W. J.; Barboriak, J. J. (VA Ctr., Wood, Wisc.). *Proc. Soc. Exp. Biol. Med.* 145(4):1353-1358, 1974.

Sprague-Dawley rats limited to food intake of 1 hr/day and allowed to run in an activity wheel developed gastric lesions which, on histologic examination, resembled human stress ulcers. The lesions in the animals started as small mucosal hemorrhages and developed progressively to form ulcers in the gastric mucosa. These lesions appeared to be initiated by a localized capillary congestion developing close to the mucosal surface below the basement membrane and "venting" toward the lumen. Pooling of blood led to a slight rise of accumulated material beneath the basement membrane, giving the appearance of pinpoint hemorrhage. Rupture of the basement membrane was probably followed by deepening and widening of the erosion and gave the appearance of a larger confluent lesion. In contrast to stress ulcers in man, no fibrin was observed in any of the lesions which developed in these rats. Most of the lesions in these rats were acute in nature and showed no evidence of healing. Some of the lesions penetrated to the submucosal layers. No thrombi were observed in the mucosal vessels.

4525 EFFECT OF SELECTIVE AND PROXIMAL GASTRIC VAGOTOMY ON SERUM GASTRIN. *(E.)* Jaffe, B. M.; Clendinnen, B. G.; Clarke, R. J.; Williams, J. A. (Washington Univ. Sch. Med., St. Louis, Mo.). *Gastroenterology* 66(5):944-953, 1974.

Forty patients with uncomplicated duodenal ulcer were randomized for treatment by either proximal gastric or selective vagotomy. Only the last 20 patients (10 with selective and 10 with proximal gastric vagotomy) had an accompanying pyloroplasty. Both types of vagotomy had equivalent effects on gastric acid secretion, inhibiting basal output an average of 79% and insulin-evoked output an average of 95%. Final gastric emptying times, measured by double dye dilution, were significantly shortened in patients who were treated by proximal gastric vagotomy plus pyloroplasty and lengthened in the 10 patients who had selective vagotomy without pyloroplasty. For all 40 patients, preoperative basal gastrin levels, measured by radioimmunoassay averaged 79 pg/ml. Both insulin and meat extract stimulated gastrin release, increasing serum gastrin levels by 50 and 67%. After vagotomy, basal gastrin concentrations were increased 57% over the preoperative determinations. Vagotomy augmented the gastrin response to meat extract; the degree of augmentation was similar in patients treated by proximal gastric or by selective vagotomy. However, the performance of a pyloroplasty limited the increased responsiveness to feeding (+155% in patients with pyloroplasty and +483% in patients without pyloroplasty). The gastrin response to insulin hypoglycemia was maintained equally after both types of vagotomy and was unaffected by pyloroplasty. In 7 patients with incomplete selective vagotomy, insulin resulted in a gastrin increase averaging 102 pg/ml, whereas in patients with complete selective vagotomy the increase averaged only 46 pg/ml.

4526 UPPER GASTROINTESTINAL DISEASE IN RHEUMATOID ARTHRITIS. *(E.)* Sun, D. C. H.; Roth, S. F.; MITCHELL, C. S.; Englund, D. W. (VA Hosp., Phoenix, Ariz.). *Am. J. Dig. Dis.* 19(5):405-410, 1974

Upper gastrointestinal series were performed on 140 consecutive patients with rheumatoid arthritis, regardless of whether or not they had symptoms suggesting upper gastrointestinal disease. In addition, intraluminal pH and manometric studies of the esophagus and esophagoscopic examinations were done in 66 of these 140 patients. Gastric ulcers were found in 12 patients, and duodenal ulcers in 27, an incidence of peptic ulcer disease of 27.8%. The highest incidence of ulcers was found in patients on corticosteroids (40%) and in those on a combination of corticosteroids with indomethacin or phenylbutazone (43%). No ulcers occurred in patients receiving gold therapy. Among the 66 patients who had esophageal motility studies, a significantly lower mean amplitude of peristaltic contractions was noted in the lower 2/3 of the esophagus. The resting pressure in the lower esophageal sphincter was also significantly lower than in the control group. However, no correlation was found between these 2 parameters and the duration or stage of rheumatoid arthritis. It is impossible to determine whether the upper gastrointestinal dysfunction observed in these patients is another systemic manifestation of the rheumatoid disease or is caused by drugs.

4527 THE EFFECT OF LOCALLY ADMINISTERED PROSTAGLANDIN 15 (R) 15 METHYL-E$_2$ METHYL ESTER ON GASTRIC ULCER FORMATION IN THE SHAY RAT PREPARATION. *(E.)* Carter, D. C.; Ganesan, P. A.; Bhana, D.; Karim, S. M. M. (Dept. Surg., Makerere U., Kampala, Uganda). *Prostaglandins* 5(5):455-462, 1974.

The 21-hr pylorus-ligated (Shay) rat model was used to assess the ulcer-protecting activity of locally administered prostaglandin 15 (R) 15 methyl-E$_2$ ester. After pyloric ligation, 0-50 µg/kg of prostaglandin were injected into the gastric lumen of female Sprague-Dawley rats. Among untreated Shay rats none were ulcer-free and 3 died. In contrast, 8 of the 15 animals receiving 50 µg/kg of prostaglandin were ulcer-free and none died. The difference in the incidence of ulcers between these two groups is highly significant. Shay rats receiving 25 µg/kg of prostaglandin also had significantly fewer ulcers than the controls. There were 5 perforations in the control group as compared with 1 perforation in each of the 3 treatment groups. Ulcers of the esophagus and glandular stomach were more common in the controls and Shay rats given 12.5 µg/kg of prostaglandin than in the animals given larger doses of prostaglandin. The weight-related acid content (mEq/kg) of the stomach at sacrifice was inversely related to the prostaglandin dosage although the mean acid content in the animals treated with 12.5 µg/kg of prostaglandin did not differ from that of the controls. The ulcer-protecting effects of locally administered prostaglandin

15 (R) 15 methyl-E$_2$ ester appear to be due to an initial inhibition of the gastric secretion induced by pyloric ligation. Consequently exposure of the gastric mucosa to unbuffered gastric juice is reduced. Although the exact mode of action of the analog is unknown, the evidence suggests direct inhibition of the gastric secretory cells.

4528 THE COEXISTENCE OF DUODENAL ULCER AND GASTRIC CARCINOMA. *(E.)* Hardy, K. J.; Grossberg, P. (Repatriation Gen. Hosp., Heidelberg, Australia). *Aust. N.Z. J. Surg.* 43(3):235-238, 1973.

Case reports are presented for 4 patients (4 men aged 32-78 yr) with coexisting gastric carcinoma and duodenal ulcer. In two cases, the duodenal ulcer had been present for more than 12 years. In the other 2 cases, the history of ulcer was short and involved weight loss, vague pain, and hematemesis. Each patient was in blood group A. Surgical treatment consisted of resection in three cases and bypass in the fourth. Two of the 4 patients developed liver metastases and died within 3 months. Since the diagnosis of gastric carcinoma is difficult in patients with duodenal ulcer, early endoscopy and exfoliative cytological examination are recommended for duodenal ulcer patients who are in blood group A, are elderly, or who have an atypical history. The prognosis of gastric carcinoma associated with duodenal ulcer is better than that of gastric carcinoma alone.

4529 GASTRIC SECRETION IN PYLORUS-PRESERVING GASTRECTOMY IN DOGS. *(E.)* Sugawara, K.; Isaza, J.; Woodward, E. R.; Eisenberg, M. M. (Univ. Florida Coll. Med., Gainesville). *Am. J. Surg.* 127(3):244-247, 1974.

The effects of pylorus-preserving gastrectomy on gastric secretory output were studied in parasympathetically denervated Heidenhain pouch dogs. After the operation, the volume decreased 75.9%; the free acid output decreased, 83.7%; the acid concentration decreased, 32.4%. Volume, free acid output, and acid concentration decreased slightly further after total antrectomy. Diminution of acid secretory rate is achievable, therefore, without sacrifice of pyloric sphincteric mechanism.

4530 SERUM GASTRIN AND GASTRIC ACID SECRETION BEFORE AND AFTER PROXIMAL GASTRIC VAGOTOMY. *(E.)* Schrumpf, E.; Roland, M.; Liavag, I. (Ulleval Univ. Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(2):115-118, 1974.

Serial determinations of the fasting serum gastrin concentrations and gastric acid secretion were performed on 8 patients with duodenal ulcer before and 3-12 months after proximal gastric vagotomy. The basal acid output and acid output after stimulation with pentagastrin (6 μg/kg s. c.) were reduced by a mean of 80% and 59%, resp. 3 months after vagotomy. A concomitant increase occurred in the mean basal gastric pH (from 1.9 ± 0.2 to 5.0 ±0.9), and the mean fasting serum gastrin concentration increased significantly. Between 3 and 12 months after proximal gastric vagotomy a moderate increase occurred in the residual gastric volume, along with a slight decrease in the basal gastric pH and the fasting serum gastrin concentration. These changes were not significant. The pH of the gastric juice appears to be the most important factor controlling fasting serum gastrin levels in patients with duodenal ulcer.

4531 EFFECT OF PROSTAGLANDIN 15 (R) 15 METHYL-E$_2$ ESTER ON THE GASTRIC MUCOSA IN PATIENTS WITH PEPTIC ULCERATION: AN ENDOSCOPIC AND HISTOLOGICAL STUDY. *(E.)* Fung, W. P.; Lee, S. K.; Karim, S. M. M. (Dept. Med., Univ. Singapore). *Prostaglandins* 5(5):465-472, 1974.

A single dose of prostaglandin 15 (R) 15 methyl-E$_2$ ester (150 μg) was administered p.o. *via* duodenofiberscope into the stomachs of 8 male Chinese patients with peptic ulcers. Gastric biopsy specimens obtained before and after prostaglandin treatment were examined endoscopically and histologically. The initial endoscopic diagnosis was acute gastritis in 6 cases, gastric ulcer in 1 case, and antral scarring with gastritis in 1 case. In 2 cases there was no significant change 1 hr after prostaglandin treatment. However, in the remaining 6 cases a marked increase occurred in viscid mucous secretion over the gastric mucosa. In 2 of these cases, the mucous secretion appeared to be "foamy". Prostaglandin also produced changes in the mucus-secreting cells in all 8 patients; mucus had accumulated in markedly increased amounts in these cells, causing peripheral displacement of their nuclei and luminal bulging of their walls. No appreciable changes occurred in the type or number of inflammatory cells or in the appearance of the parietal or chief cells. Since mucus is a natural protective material for the gastric mucosa, increased amounts of this substance might be beneficial in the healing of gastric ulceration.

4532 ASPIRIN USE IN PATIENTS WITH MAJOR UPPER GASTROINTESTINAL BLEEDING AND PEPTIC-ULCER DISEASE: A REPORT FROM THE BOSTON COLLABORATIVF DRUG SURVEILLANCE PROGRAM, BOSTON UNIVERSITY MEDICAL CENTER. *(E.)* Levy, M. (Boston Collaborative Drug Surveillance Program, Waltham, Mass.). *N. Engl. J. Med.* 290(21):1158-1162, 1974.

Possible relations between long-term regular use of aspirin-containing drugs and hospital admissions for (1) major upper gastrointestinal bleeding in the absence of known predisposing conditions and (2) newly diagnosed peptic ulcers were explored in a large hospital survey. For patients admitted with major bleeding and in whom there was no evidence of duodenal ulcer, there was a statistically significant association with aspirin taken regularly for 4 or more days/week. A similar association was found for patients admitted with newly diagnosed and uncomplicated benign gastric ulcer. The corresponding estimated incidence rates of hospital admissions for these two conditions attributable to heavy aspirin use were 15 and 10/100,000 users/yr, resp. Aspirin taken regularly for 4 or more days/week was not significantly associated with either bleeding or uncomplicated duodenal ulcer. There was no evidence of an association between light aspirin use (1-3 days/week) and the diseases under consideration.

4533 THE EFFECT OF VAGOTOMY AND DRAINAGE ON THE SMALL BOWEL FLORA. *(E.)* Browning, G. G.; Buchan, K. A.; Mackay, C. (Western Infirm., Glasgow, Scotland). *Gut* 15(2):139-142, 1974.

The incidence of bacterial colonization of the upper small intestine was assessed in 35 patients with chronic duodenal ulcer and 25 patients who had undergone elective surgery for chronic duodenal ulcer. The incidence of colonization of the upper small intestine in the unoperated patients was 3%, while in the first 7 to 10 days following vagotomy and drainage, 92% of the operated patients were colonized. None of 8 patients with a simple closure of a perforated ulcer was colonized. Thirty-two percent of the operated patients remained colonized 18 months postoperatively. The type of drainage procedure (Heinecke-Mikulicz pyloroplasty or retrocolic gastrojejunestomy) did not affect the incidence of colonization immediately after surgery. However, the incidence of colonization at follow-up was significantly lower among those subjected to pyloroplasty than among those subjected to gastrojejunostomy. The maximal acid output did not differ among those who were colonized and those who were not colonized, either immediately after or 18 months after surgery. Only two patients developed episodic diarrhea and there was no obvious association with bowel colonization. The presence of a potential blind loop among the gastrojejunostomy patients may explain the comparatively high incidence of bowel colonization among this group as compared with the pyloroplasty group.

4534 MECHANISM OF STRESS ULCER. II. DIFFERENCES BETWEEN THE ANTRUM, CORPUS, AND FUNDUS WITH RESPECT TO THE EFFECTS OF COMPLETE ISCHEMIA ON GASTRIC MUCOSAL ENERGY METABOLISM. *(E.)* Menguy, R.; Masters, Y. F. (Univ. Rochester Sch. Med. Dent., N.Y.). *Gastroenterology* 66(4):509-516, 1974.

It has been suggested that the event linking hemorrhagic shock-induced gastric mucosal ischemia and "stress ulceration" may be a rapid and profound decrease in gastric mucosal energy metabolism. To test this hypothesis, male Holtzman rats and male albino rabbits were given a 5% nutrient solution of sucrose containing a salt mixture. The next morning during laparotomy, a ligature was placed around the esophagus immediately above the stomach. At a given moment, the stomach was removed. In the rats and rabbits, the levels of ATP as well as those of (ATP + ADP + AMP) were significantly higher in the mucosa of the corpus than in the antrum. In addition, the rate of dephosphorylation was significantly greater in the mucosa of the corpus than in the antral mucosa. In rabbits, the ADP and AMP levels were significantly lower in the antral mucosa than in the corpus. In the fundus, the ATP levels were lower than in the corpus. The level of glucose-6-phosphate in the antral mucosa was lower than in the corpus or fundus. Although the energy deficit was slightly more severe in the fundus than in the corpus, this difference was not significant. Thus, the antrum is better able to sustain its energy metabolism in the face of ischemia, lending support to the original hypothesis linking stress ulceration with hemorrhagic shock-induced gastric mucosal ischemia.

4535 A RATIONAL COMBINATION OF THERAPEUTIC MEASURES IN PEPTIC ULCER. *(Rus.)* Perveyeva, V. G. (Dnepropetrovsk Munic. Psychiatric Hosp., USSR). *Vrach. Delo* (3):74-76, 1974.

4536 HEMIGASTRECTOMY AND TRUNCAL VAGOTOMY IN THE TREATMENT OF DUODENAL ULCER: WITH A SUMMARY OF RELATED SECRETORY DATA EMPHASIZING PREOPERATIVE BASAL ACIDITY AND POSTOPERATIVE BASAL-INSULIN ACHLORHYDRIA. *(E.)* Smithwick, R. H.; Farmer, D. A.; Harrower, H. W. (Boston Univ. Sch. Med., Mass.). *Am. J. Surg.* 127(6):631-649, 1974.

4537 GASTRIC RESPONSE TO METIAMIDE. *(E.)* Thjodleifsson, B.; Wormsley, K. G. (Dept. Therap., Univ. Dundee, Scotland). *Br. Med. J.* 2(5914):304-306, 1974.

4538 HUMAN GASTRIN RESPONSE TO SECRETIN POST VAGOTOMY. *(E.)* McLaughlin, M. H.; Peskin, G. W.; Saik, R. P. (San Diego Sch. Med., Calif.). *Gastroenterology* 66(4):743, 1974.

4539 MEDICAL VAGOTOMY: NEW EVIDENCE OF ITS POTENTIAL USEFULNESS AS A PREOPERATIVE TEST. *(E.)* Meeroff, J. C.; Ferreira, J. A.; Meeroff, M. (Munic. Sanit., Buenos Aires, Argentina). *Gastroenterology* 66(4):744, 1974.

4540 AN INTESTINAL DISEASE IN THE RAT PROBABLY CAUSED BY A PROSTAGLANDIN DEFICIENCY. *(E.)* Robert, A. (Upjohn Co., Kalamazoo, Mich.). *Gastroenterology* 66(4):765, 1974.

4541 RETROGRADE DUODENAL STUMP BIOPSY FOR RETAINED ANTRUM IN RECURRENT ULCER DISEASE POST-GASTRECTOMY AND BILLROTH II ANASTOMOSIS. *(E.)* Gaisford, W. D. (Latter-Day Saints Hosp., Salt Lake City, Utah). *Gastroenterology* 66(4):812, 1974.

4542 STUDY OF THE PROTEOLYTIC ACTIVITY OF GASTRIC JUICE IN RESPONSE TO MAXIMUM HISTAMINE STIMULATION. *(Sp.)* Belanzo, J.; Zeitune, J. M. R.; Perez Mota, A.; Cabre-Fiol, V.; Vilardell, F. (Santa Cruz y

San Pablo Hosp., Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 42(3):239-250, 1974.

4543 DECREASE OF HYDROCHLORIC ACID CONCENTRATIONS AFTER TRUNCAL AND SUPERSELECTIVE VAGOTOMY. *(Sp.)* Perez-Mota, A.; Zeitune, J. M. R.; Cabre-Fiol, V.; Vilardell, F. (Santa Cruz y San Pablo Hosp., Barcelona, Spain). *Rev. Esp. Enferm Apar. Dig.* 42(3): 269-276, 1974.

4544 STUDY OF ALCIAN BLUE STAINING OF GASTRIC JUICE FROM NORMAL SUBJECTS AND PATIENTS WITH PEPTIC ULCER. *(Sp.)* Rodrigo Gomez, J. M.; Guix Garcia, J.; Aparisi Quereda, L.; Tomas Ridocci, M.; Serra Desfilis, M. A.; Bixquert Jimenez, M. (Fac. Med., Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 42(3):251-260, 1974.

4545 SALIVARY SECRETION IN DUODENAL ULCER. *(Sp.)* Perez-Mota, A.; Zeitune, J. M. R.; Cabre-Fiol, V.; Vilardell, F. (Santa Cruz y San Pablo Hosp., Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 42 (3):277-280, 1974.

4546 DEVELOPMENT OF PEPTIC ULCER DISEASE IN DISEASES OF THE RESPIRATORY AND CARDIOVASCULAR SYSTEMS. *(Rus.)* Yevtushenko, V. P. (Zhitomir Reg. Hosp., USSR). *Vrach. Delo* (3):79-81, 1974.

4547 EVALUATION OF THE SECRETORY AND EXCRETORY FUNCTION OF THE STUMP OF THE RESECTED STOMACH IN PATIENTS WITH ULCER DISEASE. *(Rus.)* Sheychuk, A. G.; Romaniak, M. I.; Dudik, Iu. V.; Mamchur, F. I. (Ivano-Frankovsk Med. Inst., USSR). *Vrach. Delo* (4):42-47, 1974.

4548 USE OF GASTRIC BIOPSY IN THE EXAMINATION OF PATIENTS WITH PEPTIC ULCER. *(Rus.)* Korneichuk, A. V. (Kiev Med. Inst., USSR). *Vrach. Delo* (4):47-51, 1974.

4549 SERUM IRON CONTENT IN PATIENTS WITH POST-GASTRECTOMY SYNDROME. *(Rus.)* Mikanba, Z. M.; Kanevskaia, E. S. (Inst. Med. Stomatol., Moscow, USSR). *Vrach. Delo* (4):51-53, 1974.

See also 4221, 4222, 4337, 4373, 4420, 4465, 4466, 4513, 4518, 4522, 4704.

SMALL INTESTINE

4550 ASSOCIATED MIDGUT MALROTATION AND MECKEL'S DIVERTICULUM PRESENTING IN ADULT LIFE. *(E.)* Harvey, J. S.; Giles, G. R. (Leeds Univ. Hosp., England). *Br. J. Surg.* 61(2):157-158, 1974.

Two case reports are presented of adult patients who presented with abdominal colic and were found to have malrotation of the midgut. The first patient was 47 years old, the second was 17. The first patient gave a history of attacks of central abdominal pain and vomiting for over 7 years. The present attack had lasted for 8 hours at the time of admission, was a colicky periumbilical pain which did not radiate and was without associated symptoms. A barium enema examination revealed the colon to be situated entirely on the left of the abdomen and a barium meal and follow-through examination showed that the small bowel was mainly on the right side of the abdominal cavity. A laparotomy was performed through a midline incision, confirming a complete failure of rotation of the midgut. The caecum was in the left lower quadrant of the abdomen with the remaining colon looped up into the left hypochondrium. The palpable abdominal mass was due to a large Meckel's diverticulum which was attached by its tip to the umbilicus. The affected ileum and caecum were excised together with the Meckel's diverticulum and an end-to-end anastomosis was constructed. The second patient was complaining of a colicky central abdominal pain which had been present for 20 hours, during which time he had vomited twice with some relief of the pain. Four months later, barium studies confirmed the diagnosis of intestinal malrotation. At laparotomy the caecum was found in the left hypochondrium with complete nonrotation of the midgut. The ileum was obstructed by a loop of small bowel passing through a tunnel produced by a long Meckel's diverticulum which had folded on itself and stuck to the base of the mesentery.

4551 SURGICAL TREATMENT OF ABDOMINAL ANGINA: REVIEW OF 25 PATIENTS. *(E.)* Reul, Jr., G. J.; Wukasch, D. C.; Sandiford, F. M.; Chiarillo, L.; Hallman, G. L.; Cooley, D. A. (Texas Heart Inst., Houston). *Surgery* 75(5):682-689, 1974.

Over a period of 9 yr, 25 patients between the ages of 19 and 72 yr underwent mesenteric revascularization for symptoms of abdominal angina, a rare condition resembling the angina pectoris which is associated with coronary artery disease. In most cases, postprandial abdominal pain and loss of weight combined with arteriographic findings of occlusive lesions of at least two of the three major visceral arteries (celiac, superior mesenteric, inferior mesenteric) established the diagnosis. Simultaneous surgical correction of an associated vascular or gastrointestinal disease was performed in 14 of the patients. Concomitant lesions which were also treated included abdominal aortic aneurysm in 5 patients, renal artery hypertension in 3, and aortoiliac occlusive disease in 3. Among these 25 patients, 38 arteries were revascularized. Two patients died, both deaths resulting from mesenteric infarction following unsuccessful revascularization procedures. Nine of the 18 remaining patients were doing quite well at follow-up examinations 5 months to 8 yr later. Successful operative treatment of abdominal angina depends upon accurate preoperative diagnosis based on evaluation of the symptoms and correlation with anatomical disease.

4552 MASSIVE GASTROINTESTINAL HEMORRHAGE FROM DUODENAL DIVERTICULA.

(E.) Lapin, R.; Kamath, M. L.; Engler, J.; Friedman, H. (no affil.). *Am. J. Gastroenterol.* 61(3):185-189, 1974.

A case report is presented for a 67-yr-old man with an ulcer in the diverticulum that was diagnosed before surgery by radiological work. The patient had no evidence of chronic liver disease. At gastroscopy, performed 3 hr after admission, no lesions could be identified in the stomach or the pylorus, but blood was refluxing from the duodenum. An upper gastrointestinal series revealed a rather large diverticulum in the third portion of the duodenum without any other associated lesion. The patient's condition stabilized after transfusion of 3500 ml blood, but a decision for surgical intervention was reached 5 days after admission when the patient exhibited a drop in the hematocrit associated with melena. At operation, a duodenogastrotomy failed to reveal the source of bleeding and was closed as a pyloroplasty. After mobilization of the duodenum the diverticulum, measuring 4 1/2 cm x 2 cm, was freed posteriorly from the surrounding pancreatic tissue and, after an anterior duodenotomy was performed, the sac was inverted and excised at its neck. The diverticulum was filled with fresh clots, and the mucosa showed numerous superficial ulcerations and erosions. It is concluded that the increased use of selective angiography in the diagnosis of active gastrointestinal hemorrhage will help in more accurate preoperative localization of the bleeding site, especially in patients who have had more than one episode of bleeding and have no other significant lesion except for a duodenal diverticulum upon upper gastrointestinal x-ray examination. However, arteriography could not be performed on this patient because of technical difficulties.

4553 ACUTE AND CHRONIC MAGNESIUM DEFICIENCY FOLLOWING EXTENSIVE SMALL GUT RESECTION.

(E.) Nielsen, J. A.; Thaysen, E. H. (Aalborg Hosp. North, Denmark). *Abdominal Surg.* 16(4):87-89, 1974.

A 56-yr-old woman underwent emergency surgery for extensive resection of the small intestine because of occlusion of the superior mesenteric artery. Soon after surgery she developed the clinical manifestations of magnesium deficiency (diarrhea, mental blurring, twitchings, muscular weakness), and, after several weeks, this diagnosis was confirmed by the finding of a severely depressed serum concentration of this ion (0.8 mEq/l). The patient recovered within a few days following the i.v. administration of magnesium. Later, the treatment was supplemented with 1 g/day of potassium chloride. After 2 yr, the administration of magnesium was discontinued for 3 weeks. During the 3rd week there was a significant decline in the serum concentrations of magnesium and potassium (which was still being given); serum calcium remained virtually unchanged. The diagnosis of magnesium depletion depends upon the clinical features and measurements of magnesium in the serum and urine. Magnesium deficiency results in increased amounts of sodium and potassium salts being retained in the gut, where they may act as saline cathartics. The neuromuscular and mental disturbances of magnesium depletion are probably secondary to the hypocalcemia and to the defective transport of ions across cellular membranes. In the acute and severe magnesium deficiency syndrome, 60-100 mEq of this ion should be administered i.v. daily; long term supplementation can usually be given p.o.

4554 THE "HIDE-BOUND" SMALL BOWEL OF SCLERODERMA: CHARACTERISTIC MUCOSAL FOLD PATTERN.

(E.) Horowitz, A. L.; Meyers, M. A. (New York Hosp.-Cornell Univ. Med. Ctr., New York, N.Y.). *Am. J. Roentgens Radium Ther. Nucl. Med.* 119(2):332-334, 1973.

Small bowel series for 18 patients with scleroderma were reviewed. Eleven (61%) showed a strikingly narrowed intervalvular distance that was most marked in the jejunum and proximal ileum. Although almost invariably dilated, the duodenum did not consistently display this altered mucosal fold pattern. Sharp angulation of dilated jejunal loops with retracted folds was also noted. When barium fully opacified the dilated loops, the decreased intervalvular distance was manifested as a series of sharp "spines" projecting from the margin of the lumen. The valvulae themselves were not widened or blunted and maintained their normal axis perpendicular to the bowel lumen. No nodularity or "thumbprint" type defects were noted. Transient, nonobstructive intussusceptions occurred in 3 of the cases (17%). It is suggested that the narrowed intervalvular distances and the intussceptions are due to significant replacement of the longitudinal fibers in the muscularis propria with collagen. This condition in the small bowel is analogus to the changes that occur in the soft tissues of the hands and face, in which replacement of normal tissue by excess fibrosis creates a "hide-bound" appearance.

4555 CHANGE OF BILE ACID METABOLISM AND ABSORPTION OF VITAMIN B_{12} AFTER INTESTINAL SHUNT OPERATION IN OBESITY: A COMPARISON OF THREE TYPES OF OPERATION.

(E.) Dano, P.; Lenz, K. (Rigshosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(2):159-165, 1974.

An intestinal shunt operation for obesity was made in 33 patients. The following 3 types of operation were compared: Type I: 36 cm of proximal jejunum anastomosed end-to-side to 12 cm terminal ileum; Type II: 24 cm jejunum plus 24 cm ileum; Type III: 12 cm jejunum plus 36 cm ileum. After operation, there was a statistically significant increase of the glycine-taurine ratio in jejunal contents and of the transfer of glycine conjugates to the colon (abnormal breath test). There was a significant decrease of the bile acid concentration in the jejunum and of the absorption of vitamin B_{12}. The results in Type III-operated patients deviated significantly less from normal values for abnormal breath test and diminished vitamin B_{12} absorption than the results in patients with Type I or II operations. The study favors the choice of a Type III operation which preserves the longest segment of terminal ileum.

4556 EFFECT OF THREE TYPES OF INTESTINAL SHUNT OPERATION ON GASTRIC SECRETION IN OBESITY. *(E.)* Dano, P.; Vagn Nielsen, O. (Rigshosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(2):167-171, 1974.

In a prospective study, gastric secretion was studied before and after 3 types of intestinal shunt operation for obesity. In each type, 48 cm of functioning small intestine was preserved, but the ratio between functioning jejunum and functioning ileum was different. A slight but significant basal hypersecretion was found in patients with 24 cm or less of functioning jejunum. Peak acid output following pentagastrin stimulation was unchanged. None of the patients developed symptoms of peptic ulcer. In patients with a massive small bowel bypass, gastric hypersecretion could be due to deprivation of an inhibitor substance as well as liberation of a gastric secretagogue. By preserving a different ratio of jejunum and ileum in function, the greater role of the proximal jejunum control of the gastric secretion was confirmed.

4557 WEIGHT LOSS IN RELATION TO THE LENGTH OF SMALL INTESTINE LEFT IN CONTINUITY AFTER JEJUNOILEAL SHUNT OPERATION FOR OBESITY. *(E.)* Juhl, E.; Quaade, F.; Baden, H. (Bispebjerg Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(2):219-221, 1974.

In 10 obese patients treated with jejunoileal anastomosis leaving 50 cm of functioning small bowel (37 cm proximal jejunum anastomosed end-to-side to 13 cm of distal ileum), the absolute weight loss was approximately the same irrespective of the patient's initial weight. The average decrease was 17 kg after 3 months, 27 kg after 6 months, and 36 kg after 18 months. This means that the very obese individuals stabilized their weights at a too high level. As the weight loss proved to be unrelated to degree and duration of reflux to the excluded ileum, the functioning small bowel was shortened in the next 5 patients to 47 cm (34 cm of proximal jejunum and 13 cm of distal ileum), whereupon the weight losses were greater after 3 months (23 kg), 6 months (38 kg), and 18 months (61 kg). The results indicate that the length of functioning small intestine is the main factor determining weight loss. The operation should be individualized in accordance with the initial body weight.

4558 CIRCULATORY INSUFFICIENCY IN THE UPPER MESENTERY REGION: PHYSIOPATHOLOGY AND CLINICAL FEATURES. *(Fr.)* Lagneau, P.; Cormier, J. M. (St. Joseph Hosp., Paris, France). *Rev. Pract.* 23(31):2861-2873, 1973.

4559 SUBTOTAL RESECTION OF THE SMALL INTESTINE WHICH IS NOT URGENTLY INDICATED. *(Ger.)* Vinz, H. (Med. Acad., Magdeburg, Germany). *Zentralbl. Chir.* 98(31):1116-1121, 1973.

4560 DUODENAL DIVERTICULA: SURGICAL TREATMENT. *(Sp.)* Barrena, J.; Rodriguez, A.; del Valle, A. (Virgen del Rocio Munic. Sanit., Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 42(6):669-684, 1974.

4561 HERNIATION OF CECUM AND TERMINAL ILEUM THROUGH THE FORAMEN OF WINSLOW. *(E.)* Harned, R. K.; Farley, G. E. (Univ. Nebraska Sch. Med., Omaha). *Am. J. Gastroenterol.* 61(4):304-307, 1974.

4562 EOSINOPHILIC ENTERITIS. *(E.)* Dodds, W. J.; Geenen, J. E.; Stewart, E. T. (Med. Coll. Wisconsin, Milwaukee). *Am. J. Gastroenterol.* 61(4):308-312, 1974.

4563 A COMPARATIVE HISTOLOGIC AND KINETIC STUDY OF TWO CASES OF ILEAL MUCOSA USED AS A URINARY BLADDER. *(E.)* Deschner, E.; Goldstein, M. J.; Melamed, M.; Sherlock, P. (Memorial Sloan-Kettering Cancer Ctr., New YOrk, N.Y.). *Gastroenterology* 66(4):684, 1974.

4564 ILEAL BYPASS FOR HYPERCHOLESTEROLEMIA IN CHILDHOOD INTRAHEPATIC CHOLESTASIS. *(E.)* Ferry, G. D.; Rodriguez, J. T.; Huang, T. L.; Nichols, B. L. (Baylor Coll. Med., Houston, Tex.). *Gastroenterology* 66(4):692, 1974.

4565 DIETARY INTAKE BEFORE AND AFTER JEJUNOILEAL BY-PASS SURGERY FOR SEVERE OBESITY. *(E.)* King, D. M.; Soterakis, J.; Glennon, J. A.; Iber, F. L. (Lemuel Shattuck Hosp., Boston, Mass.). *Gastroenterology* 66(4):723, 1974.

4566 CIRRHOSIS AND DEATH AFTER JEJUNOILEAL SHUNT FOR OBESITY. *(E.)* Mangla, J. C.; Hoy, W.; Kim, Y. M.; Chopek, M. (Monroe Community Hosp., Rochester, N.Y.). *Gastroenterology* 66(4):740, 1974.

4567 PATHOGENESIS OF HEPATIC FAILURE FOLLOWING JEJUNOILEAL BYPASS. *(E.)* O'Leary, J. P.; Maher, J. W.; Hollenbeck, J. I.; Woodward, E. R. (Coll. Med., Univ. Florida, Gainesville). *Gastroenterology* 66(4):859, 1974.

4568 ENTEROGENOUS CYST OF THE DUODENUM. *(E.)* Ortiz, V. M.; Nealon, Jr., T. F.; Mitty, Jr., W. F. (New York Univ. Med. Ctr., West Point). *Am. J. Gastroenterol.* 61(4):276-281, 1974.

4569 THE DEVELOPMENT OF LAENNEC'S CIRRHOSIS IN ASYMPTOMATIC PATIENTS WITH SMALL BOWEL BYPASS FOR MASSIVE OBESITY. *(E.)* Bagheri, S. A.; Barbato, T. L.; Ferguson, D. J.; Boyer, J. L. (Pritzker Sch. Med., Univ. Chicago, Ill.). *Gastroenterology* 66(4):878, 1974.

4570 THE HISTOPATHOLOGY OF HUMAN GRAFT-VERSUS-HOST DISEASE (I-GVHD). *(E.)* Kao, G. F.; Lerner, K. G. (Univ. Washington, Seattle). *Gastroenterology* 66(4):888, 1974.

4571 ENDOSCOPIC LOCALIZATION OF A DUODENAL WALL TUMOR IN ZOLLINGER-ELLISON SYNDROME. *(E.)* Wu, W. C.; Kengis, J.; Whalen, G. E.; Schulte, W. J.; Unger, G. F.; Classen, M. (VA Ctr., Wood, Wis.). *Gastroenterology* 66(6):1237-1239, 1974.

4572 INTRALUMINAL DIVERTICULUM OF THE DUODENUM: REPORT OF A CASE WITH ROENTGENOLOGIC AND ENDOSCOPIC APPEARANCE. *(E.)* Rosenak, B. D.; Chernish, S. M.; Robb, J. A.; Miller, R. E. (Marion County Gen. Hosp., Indianapolis, Ind.). *J. Indiana State Med. Assoc.* 67(5):325-328, 1974.

4573 DUODENAL AND JEJUNAL DIAPHRAGMS IN A PREMATURE INFANT. *(E.)* Anonymous. (Mt. Sinai Hosp., New York, N.Y.). *Mt. Sinai J. Med. N.Y.* 41 (3):490-492, 1974.

4574 EFFECT OF SMALL BOWEL BYPASS ON GASTRIC SECRETORY FUNCTION: POSTINTESTINAL EXCLUSION HYPERSECRETION, A PHENOMENON IN SEARCH OF A SYNDROME. *(E.)* Buchwald, H.; Coyle, J. J.; Varco, R. L. (Univ. Minnesota Med. Sch., Minneapolis). *Surgery* 75(6):821-828, 1974.

4575 SMALL BOWEL RESECTION AND GASTRIC ACID HYPERSECRETION. *(E.)* Buxton, B. (Roy. Melbourne Hosp., Australia). *Gut* 15(3):229-238, 1974.

See also 4142, 4367, 4376, 4404, 4406, 4408, 4411, 4427, 4455, 4456, 4467, 4515, 4536, 4578, 4584, 4594, 4704, 4911, 4916, 4924, 4925, 4927.

SMALL INTESTINE

Malabsorption

4576 EVALUATION OF A NEW FEEDING FORMULA FOR SUGAR MALABSORPTION. *(E.)* Walker-Smith, J.; Paterson, H.; Keating, S. (St. Bartholomew's Hosp., London, England). *Med. J. Aust.* 21(3):107-110, 1973.

Experience with a new versatile feeding formula for use in children with sugar malabsorption is reported. The formula CF_1 is a milk-based formula made from a medium calcium coprecipitate, which contains approximately 95% of the protein present in whole milk. In the preparation, the principal whey allergens, bovine serum albumin, and beta-lacto-globulin, are either denatured or omitted. The formula may be used as CF_1 plus 7.7% glucose initially, for children with lactose or sucrose, disaccharide, malabsorption. It can also be used as CF_1 plus 7.7% fructose in children with glucose malabsorption unaccompanied by fructose malabsorption. CF_1 may be used as a completely carbohydrate free formula for a short period and then with increasing increments of carbohydrate in infants with monosaccharide malabsorption. Of 39 children given this formula, 18 had sugar malabsorption as a complication of gastroenteritis. 8 had miscellaneous primary medical disorders with which sugar malabsorption is associated; and 12 had developed malabsorption after operation in the neonatal period. In 10 of 20 children who were given CF_1 with added carbohydrate, the clinical response to commencement of this feeding formula was rapid and effective with disappearance of diarrhea and rapid weight gain. Nineteen children were given CF_1 initially as a carbohydrate-free formula, and then increasing amounts of carbohydrate were added. In 4 children the weight gain was excellent, and in 12 the initial weight gain was slow, but was later satisfactory. Complications included hypoglycemia and hypokalemia. It is concluded that this feeding formula may well serve infants with massive small intestinal resection while they are intolerant to carbohydrates, but as their intolerance to carbohydrate diminishes they can then be given progressively larger amounts of carbohydrates.

4577 LATENT CELIAC SPRUE. *(E.)* Weinstein, W. M. (Dept. Med., Alberta, Edmonton, Canada). *Gastroenterology* 66(4):489-493, 1974.

The relation between dermatitis herpetiformis along with morphologically normal small intestinal mucosa and latent celiac sprue is presented. Two patients with dermatitis herpetiformis and one normal volunteer, all of whom had morphologically normal small intestinal mucosa, were placed on a high gluten diet for 22 to 30 weeks. Moderately abnormal and severe "flat" mucosal lesions were induced in both patients with dermatitis herpetiformis, but not in the normal volunteer. Neither patient with dermatitis herpetiformis developed clinical or laboratory evidence of malabsorption. On completion of the high gluten diet, 1 patient with dermatitis herpetiformis was studied on a normal gluten-containing diet, and his intestinal mucosa reverted toward normal by 16 weeks. Latent celiac sprue may be defined as a condition in which the intestinal mucosa becomes unequivocally abnormal in response to increased dietary gluten.

4578 MALABSORPTION SECONDARY TO MESENTERIC ISCHEMIA. *(E.)* Meyers, M. A.; Kaplowitz, N.; Bloom, A. A. (New York Hosp.-Cornell Univ. Med. Ctr., N.Y.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 119(2):352-358, 1973.

A 62-yr-old man was hospitalized with a history of diarrhea and a 70 pound weight loss over a 15 month period. The clinical impression of malabsorption was confirmed by a radioactive triolein study demonstrating excretion of 50.5% of the administered dose of labeled fat in a pooled 72-hr stool specimen (normal is less than 5%). Less than 6.6% of the administered ^{131}I label appeared in the urine within 24 hours. An upper gastrointestinal and small bowel series, utilizing a colloidal barium suspension, demonstrated a sprue-like pattern, characterized principally by dilated jejunal loops, segmentation, and a transient ileal intussusception. On the 12th hospital day, the patient died after developing severe generalized abdominal pain and an abdominal bruit. At autopsy, there was infarction of the intestine extending from 1 cm distal to the ligament of Trietz to the rectosigmoid junction with a 0.5 cm perforation of the midjejunum secondary to infarct necrosis. In the ileum there was evidence of marked mucosal atrophy and submucosal fibrosis antedating the final episode. Three thrombi were found in the common celiacomesenteric trunk. A prepyloric ulcer of the greater curvature of the stomach had perforated, producing acute peritonitis. Acute centrolobular necrosis of the liver was also observed. It is concluded that a small bowel series demonstrating the features of mild dilatation of proximal jejunal loops with stasis, in the absence of hypersecretion and significant segmentation, is helpful in the differentiation of ischemic malabsorption from idiopathic sprue.

4579 ROUTE OF PROTEIN LOSS DURING A MODEL PROTEIN-LOSING GASTROPATHY IN DOGS. *(E.)* Munro, D. R. (Dept. Physiol., Univ. Michigan, Ann Arbor). *Gastroenterology* 66(5):960-972, 1974.

A protein-losing gastropathy was induced in mongrel dogs by irrigating their stomachs with dithiothreitol. Successful production of protein-losing gastropathy was diagnosed by leakage of Evans blue into the gastric contents after it had been injected into the left femoral vein. Horseradish peroxidase and Evans blue were injected into the left gastroepiploic artery in dogs without pouches to trace the route of vascular protein loss into the stomach lumen. Dithiothreitol consistently induced protein-losing gastropathy. Microscopically the damage consisted of dilation of the intercellular space and vacuole formation in a few surface mucous cells. In controls injected with peroxidase, the dense reaction product was always found in mucosal capillaries, but only rarely in small, restricted areas of the lamina propria. In dithiothreitol-treated dogs the peroxidase reaction product was consistently detected in the blood vessels, the lamina propria, the dilated and normal undilated intercellular space, and the gastric lumen. It is concluded that most protein loss occurs by an intercellular route in this acute protein-losing gastropathy.

4580 HISTOCHEMICAL STUDY OF JEJUNAL MUCOSA IN IDIOPATHIC TROPICAL MALABSORPTION SYNDROME. *(E.)* Tandon, B. N.; Bose, S. L. (All-India Inst. Med. Sci., New Delhi). *Indian J. Med. Res.* 62(1):93-98, 1974.

A histochemical study was made of jejunal biopsies from 18 patients (6 females and 12 males, aged 16-50 yr) with idiopathic tropical malabsorption syndrome. All but one patient had bowel disturbances, characterized by increased frequency of motion with passage of unformed semisolid or watery feces. Seventeen patients had lost from 2 to 7 kg in 6 months to 3 yr, and 11 patients had varying degrees of anemia. D-xylose absorption was abnormal in 15 cases, steatorrhea was present in 11 cases, and vitamin B_{12} malabsorption was diagnosed in 7 of the 15 patients on whom the Schilling test was performed. Jejunal histology was abnormal in 11 and normal in 7 patients. Alkaline phosphatase, the brush border marker enzyme was normal in 13, slightly decreased in 1 and markedly reduced in 1. Mitochondrial marker enzyme succinic dehydrogenase was markedly reduced in 17 cases and normal in only 1 patient. All the 7 patients with normal jejunal histology had decreased succinic dehydrogenase activities. Thus, mitochondrial injury, as indicated by reduced activity of the marker enzyme, succinic dehydrogenase, is an important feature in patients with idiopathic tropical malabsorption syndrome. Since mitochondria are the site of oxidative metabolism of the enterocyte, the absorptive and oxidative function of the cells fails due to mitochondrial injury. The finding of apparently well preserved brush border marker enzyme would suggest that the damage to the microvilli and the fuzzy coat is not an early or an important event in the organelle pathology of idiopathic tropical malabsorption syndrome. Thus, reduction in the surface area for absorption, due to damage of microvilli may not be as important in the pathophysiology of malabsorption in patients with idiopathic tropical malabsorption syndrome as biochemical derangements resulting from mitochondrial injury.

4581 INTESTINAL COCCIDIOSIS IN A PATIENT WITH ALPHA-CHAIN DISEASE. *(E.)* Henry, K.; Bird, R. G.; Doe, W. F. (Roy. Postgrad. Med. Sch., Hammersmith Hosp., London, England). *Br. Med. J.* 1(5907):542-543, 1974.

During an ultrastructural study of small-intestinal mucosa from a 23-yr-old Sardinian man suffering from α-chain disease, coccidia were identified within the absorptive and crypt epithelial cytoplasm immediately above the basement membrane. Although the intestinal coccidiosis in this case may be nothing more than a superimposed infection in an immunologically defective patient and may not play any etiological role in the pathogenesis of α-chain disease, this finding may be significant and warrants further investigation.

4582 ACTION OF 1α-HYDROXY VITAMIN D_3 ON CALCIUM ABSORPTION AND BONE RESORPTION IN MAN. *(E.)* Peacock, M.; Gallagher, J. C.; Nordin, B. E. C. (Gen. Infirm., Leeds, England). *Lancet* 1(7854):385-389, 1974.

Synthetic 1-α-hydroxy vitamin D_3 (1-α-hydroxycholecalciferol) was given p.o. in a dose of 25 μg/day to groups of patients in whom calcium malabsorption was a recognized feature. The patients responded with an increase in plasma calcium and phosphate and in calcium absorption irrespective of their pretreatment values. Net calcium resorption from bone was increased in all patients with normal renal function. In patients with renal failure, however, net bone resorption tended to decrease. The onset of action was rapid and could be seen within 24 hr. When administration of the vitamin was discontinued, the effects were not maintained and their disappearance depended on the duration of treatment. The vitamin is very potent in man and will be useful in treatment of patients with calcium malabsorption. The malabsorption of calcium in elderly people is not due to failure of the absorptive mechanism in the small bowel since these patients respond to the vitamin. However, the dose should be less than 25 μg/day to avoid excessive bone resorption and hypercalcemia.

4583 A FAMILY WITH PROTEIN-LOSING ENTEROPATHY. *(E.)* Shani, M.; Theodor, E.; Frand, M.; Goldman, B. (Chaim Sheba Med. Ctr., Tel Hashomer, Israel). *Gastroenterology* 66(3):433-445, 1974.

Eight of 28 children in 2 sibships resulting from consanguineous matings of first cousins once removed were affected by various combinations of edema, growth retardation, diarrhea, abdominal pain, and/or clubbing. Four of the patients died after they developed ascites. Autopsies on two of these cases revealed hepatic vein stenosis resulting in a Budd-Chiari syndrome. Laboratory examinations showed all affected family members had iron-deficiency anemia and low serum albumin and globulin; in some cases, mild eosinophilia was present. All patients had normal WBC. Five patients were investigated in detail, and a protein-losing enteropathy was revealed in all cases. In some patients, the intestinal biopsy showed slight to marked dilation of the mucosal lymphatics. Lymphangiography was normal in all 5 patients, and 3 formed antibodies in response to immunization with TAB vaccine. Administration of prednisone to 3 patients resulted in the disappearance of abdominal pain and edema in 2 cases, and the patients gained a considerable amount of weight. Serum protein levels returned to normal in all 3 prednisone-treated patients, their polyvinylpyrrolidone excretion decreased, and the parameters of protein metabolism returned to normal in the 1 patient in which they were reinvestigated. The cause of this familial protein-losing enteropathy is unknown, but it appears to be transmitted by an autosomal recessive mechanism.

4584 INTESTINAL MALABSORPTION: FIRST MANIFESTATION OF AMYLOIDOSIS IN FAMILIAL MEDITERRANEAN FEVER. *(E.)* Ravid, M.; Sohar, E. (Chaim Sheba Med. Ctr., Tel-Aviv, Israel). *Gastroenterology* 66(3):446-449, 1974.

Proteinuria, progressing to nephrosis, is the first clinical manifestation in virtually all cases of secondary amyloidosis and that associated with familial Mediterranean fever. Two cases of familial Mediterranean fever are described in which severe intestinal malabsorption was the presenting symptom of amyloidosis. In neither patient, one a 20-yr-old male and the other a 24-yr-old male, had there been previous evidence of renal involvement. Both patients received oral tetracycline. One of them gained some weight on tetracycline and a high-protein low-residue diet, but the degree of steatorrhea remained unchanged. Amyloidosis, which was demonstrated on rectal biopsy in both patients, was probably the sole cause of the intestinal malabsorption. Thus, clinicians should be aware of the possibility of amyloidosis being the cause of malabsorption, even in patients who show no evidence of renal damage.

4585 THE PATHOGENESIS, DIAGNOSIS AND TREATMENT OF MALDIGESTION. *(E.)* Wildgrube, H. J.; Siede, W. (Dept. Internal Med., Johann Wolfgang Goethe Univ., Frankfurt, Germany). *Acta Hepatogastroenterol.* 21(2):151-160, 1974.

4586 JEJUNAL UPTAKE OF CONJUGATED FOLATE IN MAN. *(E.)* Halsted, C. H.; Baugh, C. M.; Butterworth, Jr., C. E. (Dept. Med., Univ. California, Davis). *Gastroenterology* 66(4):706, 1974.

4587 ENTEROTOXIGENIC INTESTINAL BACTERIA IN TROPICAL SPRUE. II. EFFECT OF BACTERIA AND THEIR ENTEROTOXIN ON INTESTINAL STRUCTURE. *(E.)* Klipstein, F. A.; Schenk, E. A. (Univ. Rochester Sch. Med., N.Y.). *Gastroenterology* 66 (4):725, 1974.

4588 ANTIBIOTIC OR FOLATE THERAPY IN THE ENTEROPATHY OF ADULT MALNUTRITION: INITIAL OBSERVATIONS. *(E.)* Mayoral, L. G.; Bolano, O.; Lotero, H.; Duque, E. (Valle Med. Sch., Cali, Columbia). *Gastroenterology* 66(4):741, 1974.

9 TROPICAL SPRUE IN AMERICAN SERVICEMEN FOLLOW-
ING RETURN FROM VIETNAM. I. CLINICAL AND
ORATORY FINDINGS. *(E.)* Pittman, F. E.; Pittman,
C. (Med. Univ. South Carolina, Charleston). *Gastro-
erology* 66(4):760, 1974.

0 TROPICAL SPRUE IN AMERICAN SERVICEMEN FOLLOW-
ING RETURN FROM VIETNAM. II. ELECTRON MICRO-
PY OF PRE- AND POST-TREATMENT BIOPSIES OF JEJUNAL
OSA. *(E.)* Pittman, F. E.; Pittman, J. C. (Med.
v. South Carolina, Charleston). *Gastroenterology*
4):761, 1974.

1 ACQUIRED HYPEROXALURIA: RELATIONSHIP TO
DIETARY CALCIUM CONTENT AND SEVERITY OF
ATORRHEA. *(E.)* Stauffer, J. Q.; Stewart, R.
Bertrand, G. (Upstate Med. Ctr., Syracuse, N.Y.).
troenterology 66(4):783, 1974.

2 ASSESSMENT OF FOLATE MALABSORPTION IN
CELIAC SPRUE COMPARING SYNTHETIC (^{3}H)
ROYLPOLYGLUTAMATE, (^{3}H)PteGlu$_7$, AND (^{3}H)PTERO-
ONOGLUTAMATE, (^{3}H)PteGlu. *(E.)* Rosenberg, I.
Godwin, H. A.; Russell, R. M.; Franklin, J. L.
affil.). *J. Clin. Invest.* 53(6):66a, 1974.

3 LACTOSE INTOLERANCE IN YOUNG CHILDREN AND
THEIR PARENTS. *(E.)* Jones, D. V.; Latham,
C. (Grad. Sch. Nutrition, Cornell Univ., Ithaca,
.). *Am. J. Clin. Nutr.* 27(6):547-549, 1974.

4 QUANTITATION OF MALABSORPTION INDUCED BY
INTESTINAL BY-PASS SURGERY FOR OBESITY.
) Hussain, I.; Rubulis, A.; Flood, M. S.;
ugh, J.; Faloon, W. W. (Highland Hosp.,
hester, N.Y.). *Gastroenterology* 66(4):715, 1974.

5 BILE ACID MALABSORPTION IN INFANTILE DIARRHEA.
(E.) Balistreri, W. F.; Partin, J. C.;
ubert, W. K. (Children's Hosp. Res. Fdn.,
cinnati, Ohio). *Gastroenterology* 66(4):832, 1974.

4596 ASSOCIATION BETWEEN INTESTINAL LACTASE ACTIVITY AND ERYTHROCYTE GALACTOKINASE IN BLACKS. *(E.)* Bayless, T. M.; Rothfeld, B.; Back, C.; Tedesco, T. A.; Miller, K.; Mellman, W. J. (Johns Hopkins Univ. Sch. Med., Baltimore, Md.). *Gastroenterology* 66(4):833, 1974.

4597 ALTERATIONS IN THE ENTEROHEPATIC CIRCULATION OF BILE ACIDS INDICATED BY POSTPRANDIAL SERUM BILE ACID CONCENTRATIONS. *(E.)* Larusso, N. F.; Korman, M. G.; Hoffman, N. E.; Hofmann, A. F. (no affil.). *J. Clin. Invest.* 53(6):43a-44a, 1974.

4598 CLINICAL STUDY OF MALABSORPTION. *(Fr.)* Jankowski, J. M. (Fac. Med., Tours, France). *Ouest Med.* 26(3):253-260, 1973.

4599 GLUCOSE AND GALACTOSE INTOLERANCE IN CHILDREN. *(Rus.)* Tabolin, V. A.; Korneva, T. I.; Lebedev, V. P.; Kurgasheva, E. K. (N. I. Pirogov 2nd Moscow Med. Inst., USSR). *Vopr. Okhr. Materin. Det.* 18(10):12-15, 1973.

4600 MEASUREMENT OF FRACTIONAL GASTROINTESTINAL ABSORPTION OF CALCIUM IN CHRONIC RENAL INSUFFICIENCY. *(Fr.)* Chanard, J.; Russo-Marie, F.; Funck-Brentano, J. L. (Necker Hosp., Paris, France). *Ann. Med. Interne (Paris)* 125(4):381-384, 1974.

See also 4176, 4352, 4364, 4369, 4387, 4389, 4432, 4464, 4501, 4555, 4695.

LARGE INTESTINE

1 LIFE WITH A CONVENTIONAL ILEOSTOMY. *(E.)*
Bone, J.; Sorensen, F. H. (Aarhus Kommune-
pital, Denmark). *Dis. Colon Rectum* 17(2):194-
, 1974.

ollow-up study was made of 52 patients (23 men
29 women) who had undergone proctocolectomy and
ventional ileostomy for ulcerative colitis (50
es), familial polyposis (1 case), and congenital
acolon (1 case). Patients were interviewed
ut stomal function, working capacity, social adap-
ion, and sex life. The quality of life was con-
ered normal in 49 of these 52 patients. Two pa-
nts had intractable skin problems, and 1 was un-
e to adapt emotionally to a conventional ileostomy.
plications of the ileostomy included skin excoriation (16 cases), ileostomy stenosis (6 cases), stomal recession (2 cases), and minor hernias around the ileostomy (4 cases). After instruction in the use of either the karaya ring or aluminium hydroxide gel and karaya rubber powder, skin problems cleared up in 12 of 16 patients. Two patients with retracted ileostomies required surgery to cure their skin problems. The mucosa had not been everted and sutured to the skin at the time of surgery in all patients who developed ileostomy stenosis. Although 9 patients were receiving disability pensions, only 3 were receiving pensions for reasons related to the ileostomy and 2 of these appeared fit and healthy. The 52 ileostomy patients were distributed in approximately the same social levels as the normal population, and there was no great change after surgery although some of

the men had higher social status because of their greater working capacity. The ileostomy caused or contributed to divorce in 3 cases. Of the 38 married patients, only 1 had marital problems because her husband was unable to accept the ileostomy. Sexual function remained unchanged after surgery in 17 of the 23 men and in 21 of the 29 women. Six patients had married after ileostomy, and 6 had become pregnant. It is suggested that Kock's continent ileostomy might benefit patients who fail to adapt to conventional ileostomy.

4602 FLUOROURACIL, IMIDAZOLE CARBOXAMIDE DIMETHYL TRIAZENO, VINCRISTINE, AND BISCHLOROETHYL NITROSOUREA IN COLON CANCER. *(E.)*

Falkson, G.; VanEden, E. B.; Falkson, H. C. (H. F. Verwoerd Hosp., Pretoria, South Africa). *Cancer* 33(5):1207-1209, 1974.

A randomized clinical trial was undertaken comparing the effects of (1) fluorouracil (15 mg/kg/day i.v. for 5 days each month); and (2) fluorouracil (10 mg/kg/day i.v. on days 1 to 5; imidazole-4-carboxamide, 5-(3,3-dimethyl-1-triazeno) (3 mg/kg/day i.v. on days 1 and 2); vincristine (0.025 mg/kg/day i.v. on day 1); and 1,3-bis-(2-chloroethyl)-1-nitrosourea (1.5 mg/kg i.v. on day 1) on metastulic colon cancer. Courses for patients in group (1) and (2) were repeated at monthly intervals if hematologic toxicity permitted for as long as improvement continued or the disease remained static. In group (2) the maximum dose given was calculated on ideal body weight. Of 24 patients in group (1), complete remission occurred in 2, partial remission in 4, improvement in 3, no change in 4, and progressive disease in 11. Of 28 patients randomized to group (2), complete remission occurred in 4, partial remission in 8, improvement in 4, no change in 2, and progressive disease in 10. The worthwhile response rate in patients receiving fluorouracil was therefore 25%, while that in the group receiving the four-drug combination was 42.8%. Hematologic toxicity was comparable in the 2 groups, while nausea and vomiting were much more severe in those patients receiving the four-drug combination. Alopecia occurred in all patients on the four-drug combination who received more than 2 courses of treatment. Although administration of 5-fluorouracil alone is more acceptable to the patients, the four-drug combination should be considered for young patients with metastatic colon cancer who can tolerate its greater toxicity.

4603 PATHOGENESIS OF HYPERPLASTIC POLYPS OF THE COLON: A HYPOTHESIS BASED ON ULTRASTRUCTURE AND IN VITRO CELL KINETICS. *(E.)*

Hayashi, T.; Yatani, R.; Apostol, J.; Stemmermann, G. N. (Kuakini Hosp., Honolulu, Haw.). *Gastroenterology* 66(3):347-356, 1974.

Light and electron microscope examinations were performed on 45 polyps taken from segments of 19 colons removed for carcinoma, polyp, or diverticulitis in organ cell culture. The normal renewal cycle of the intestinal epithelium was characterized by the proliferation of stem cells in the basal portions of the crypts, migration of maturing cells toward the surface, and extrusion of the mature cells from the surface into the gut lumen. The morphology of the hyperplastic polyp and its *in vitro* cell kinetics indicate that it results from a disturbance of this cycle so that detachment of the mature cells is delayed or impeded so that the retained epithelium becomes hypermature. The morphological features which support this hypothesis are the superficial location of maximal change, cell elongation, an increase in the number and length of the microvilli, accentuation of the lateral intercellular interdigitations, and an increase in the breadth of the basal lamina attachment. Cell kinetics studies demonstrated that the mode of cell renewal in polyps is the same as in normal mucosas, but with longer turnover times and delayed migration.

4604 PANETH CELL METAPLASIA IN DISEASES OF THE COLON AND RECTUM. *(E.)*

Symonds, D. A. (Massachusetts Gen. Hosp., Boston). *Arch. Pathol.* 97(6):343-347, 1974.

The colonic distribution of Paneth cells was studied in sections of normal colon and rectum obtained from 20 adults and 10 children, and these findings were compared with those obtained on segments of colon from 287 patients with a variety of diseases of the colon and from 7 patients with cystic fibrosis. In normal colon Paneth cells were confined to the cecal mucosa near the ileocecal valve in the 5 specimens (2 adults and 3 neonates) in which they were found. Many Paneth cells were detected in specimens from 37 of the 40 patients with ulcerative colitis, 29 of 32 patients with solitary juvenile polyps of the sigmoid and rectum, 23 of the 50 patients with villous adenomas in the rectosigmoid, and many of the 35 patients with colloid (mucinous) adenocarcinomas. Moderate numbers of Paneth cells were found in specimens from 2 of 7 patients with cystic fibrosis and all 4 patients with amebic colitis. Only a few Paneth cells were present in specimens from 7 of the 30 patients with diverticulitis, 4 of 45 with nonmucinous carcinomas, and 12 of 50 with adenomatous polyps. With the exception of ulcerative colitis, in which Paneth cells were sometimes associated with decreased numbers of goblet cells, Paneth cells were consistently associated with goblet cell hyperplasia and increased mucin deposition and were most numerous where mucin deposition was most pronounced, as around colloid carcinomas. These findings suggest that Paneth cells may control the viscosity or related physicochemical properties of gastrointestinal mucins. Such a function could aid in eliminating increased mucins or abnormal mucus deposits which were prominent morphological features in some of the diseases studied.

4605 RECTAL PRESSURE IN CHILDREN WITH PROLAPSE RECTUM. *(E.)*

Jha, B. N.; Prakash, O.; Choudhary, D. K.; Prasad, P. B. (Patna Med. Coll. Hosp., India). *Indian Pediatr.* 10(10):595-598, 1973.

Rectal pressure studies were done in 20 children, aged 6-11 yr, with prolapse of the rectum. Changes observed in lying down, commode, and squatting postures, with or without straining, were compared. In a prone posture, the average rectal pressure was bout the same in controls and in patients with rectal rolapse and normal sphincters. The pressure read-ngs doubled during straining in both groups. In he commode position, the average reading was 35 cm f water in controls and 44 cm in children with rec-al prolapse. The readings increased to 68 cm and 8 cm, resp. during straining. In the squatting osition, the average pressure was 49 cm in controls nd 54 cm in patients with prolapse. The pressures ose to 107 and 110 cm, resp. with straining. Among atients with prolapse who had patulous sphincters, owever, average pressure values of 79 and 30 cm were easured with and without straining resp. in squatting osition. The results suggest that: (1) the squat-ing position and straining on squatting generates igher intrarectal pressures than the prone or commode ostures; (2) the rise in intrarectal pressure is omparable in both normal subjects and those with ectal prolapse; and (3) there is a fall in pressure n patients with patulous anal sphincters. It is oncluded that squatting should be avoided by children ith rectal prolapse. The use of Gallow's splint as helpful in 6 patients on whom it was tested.

606 METACHRONOUS COLORECTAL POLYPS: COMPARISON OF DEVELOPMENT OF COLORECTAL POLYPS ND CARCINOMAS IN PERSONS WITH AND WITHOUT HISTORIES F POLYPS.

(E.) Brahme, F.; Ekelund, G. R.; Nor-en, J. G.; Wenckert, A. (San Diego Univ. Hosp., alif.). *Dis. Rectum Colon* 17(2):166-171, 1974.

o determine whether the presence of a colorectal olyp implies an increased risk of subsequent colorec-al carcinoma or benign polyps, follow-up examinations ere performed on 123 patients who had had a colo-ectal polyp diagnosed radiologically by the double ontrast method between 1955 and 1957. All patients ere more than 18 yr old and had resided in Malmo, weden during the entire period of the investigation. iagnosis of the index polyp had been confirmed by adiological examination on at least one additional ccasion, or by biopsy or autopsy. The index polyp as not associated with a previous or simultaneous arcinoma or with any carcinoma found within 5 yr fter the original radiological diagnosis had been stablished. These 123 patients were compared with 23 age- and sex-matched controls with radiographi-ally normal findings between 1955 and 1957. One r more new polyps were diagnosed in 26 patients with olorectal polyps and in 11 controls. The difference etween these 2 groups is significant. When patients ith only metaplastic, mesenchymal, or inflammatory olyps were excluded, 24 patients (16 men and 8 wo-en) had developed new polyps. More than one polyp as found in 7 (29%) of these 24 patients, and a otal of 39 new polyps were diagnosed. Of these 39 ew polyps, 59% were found in the left hemicolon nd rectum. Three patients developed adenocarcinomas f the large intestine 65 months to 8 yr after diag-osis of the index polyp. No colorectal carcinomas eveloped among controls. It is concluded that the resence of one or more colorectal polyps implies an ncreased risk for the patient to develop additional olyps. No statistical conclusions can be drawn about hether the presence of colorectal polyps increases he risk of developing cancer of the large intes-ine.

4607 ENDOCAVITARY IRRADIATION IN THE CURATIVE TREATMENT OF EARLY RECTAL CANCERS.

(E.) Papillon, J. (Leon Berard Ctr., Lyon, France). *Dis. Colon Rectum* 17(2):172-180, 1974.

Between 1951 and 1969, endocavitary irradiation was employed in the treatment of 152 patients with invasive adenocarcinomas of the rectum. Using the Phillips contact x-ray machine, 3000-4000 rads, given over a 3-min period, were administered every 7-10 days for 4-6 weeks (total doses of 9000-15,000 rads). This method is applicable only if the tumor is (1) small, (2) noninfiltrating, (3) fairly well-differentiated, and (4) low enough in the rectum so that the entire mass is accessible. Of 106 patients treated between 1951 and 1966 and followed for more than 5 yr, 75 (70%) are alive, well, and have no evidence of malignancy. Irradiation alone was administered to 71 patients, while 4 had to undergo surgery after radiotherapy failed. Local failure occurred within the first 2 yr in 12 patients who underwent radical surgery: 8 died and 4 were alive and free of malignancy after 5 yr. Two patients had rapid recurrences of colloid carcinomas and, despite surgery, died of metastases within the first 2 yr. Within the first 5 yr there were 15 deaths unrelated to the primary malignancy and 16 deaths from malignant disease. Endocavitary irradiation was used to destroy the exophytic part of the tumor and a radium implant was applied to the base of the tumor 6 weeks later in 20 of the 46 patients treated between 1967 and 1969. Of these 46 patients who were followed for 2-5 yr, 39 are alive with no evidence of disease 4 yr after treatment. There were 9 failures. Of the 8 who underwent surgery, 4 are alive and well 2-5 yr later. One patient was inoperable and 2 died of intercurrent disease. There are very few complications and no risk of mortality associated with endocavitary irradiation. The procedure is well tolerated, even in poor-risk and senile patients. However, tumors should meet the above criteria and careful follow-up of patients is necessary.

4608 IRRITABLE COLON: A PRELIMINARY STAGE OF COLONIC DIVERTICULOSIS.

(E.) Thijn, C. J. P. (Univ. Hosp., Groningen, Netherlands). *Radiol. Clin. Biol.* 42(6):468-481, 1973.

Data from the literature and from personal observations indicate that an irritable colon syndrome, which persists for years, is a precursor of colonic diverticulosis, which develops fully in the course of a few decades. This is supported by the age distribution of patients with these 2 conditions. The mean age of 37 patients with irritable colon was 46 yr, while that of 70 patients with colonic diverticulosis was 64 yr. In addition, no sharp differentiation between these conditions can be made on the basis of symptoms, suggesting that colonic diverticulosis and irritable colon are different phases of the same clinical entity. Irritable colon is initially dominated by disorders of motility, giving rise to small diverticula which are then enlarged as a result of increased intraluminal pressure. Two case reports are presented. In the first, diverticula were found only proximal to a stenosing neoplasm in the transverse colon. In the second, 3 consecutive colon studies showed the development and subsequent slight reduction in size of a number of small diverticula. Improvement may have been due to the use of a high-residue diet. The principal causes of irritable colon are assumed to be low-residue nutrition, emotional stress, and dysregulation between the sympathetic and parasympathetic nervous system. The recommended method of investigation is dual-contrast radiography, with the aid of which even incipient diverticulosis can be demonstrated.

4609 ROENTGENOLOGY OF INFECTIOUS COLITIS.

(E.) Farman, J.; Rabinowitz, J. G.; Meyers, M. A. (State Univ. New York-Downstate Med. Ctr., Brooklyn). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 119(2): 375-381, 1973.

Barium enema examination in 7 patients (2 men and 5 women, aged 21-56 yr) with infectious colitis due to *Salmonella* or *Shigella* revealed diffuse colonic involvement in 2 and segmental colonic involvement in 5. One patient with diffuse disease had an atonic colon with loss of the normal haustral pattern. A small bowel examination in this patient showed ulceration, edema, and dilation of the duodenum, jejunum, and ileum. The second patient with total colonic involvement manifested a dilated edematous colon and superficial ulcerations in the sigmoid. The descending colon was a frequent site of segmental colitis; rectal involvement was variable and in some cases skip lesions alternated with areas of normal bowel. Spasm, edema, and ulceration were the main roentgenologic features in the involved areas. At times the ulcers were superficial and resembled those seen in classical colitis; on other occasions the ulcers were deep and resembled those visualized in Crohn's disease. Colonic changes were reversible in all patients who responded to therapy. Thus the reversibility of the ulcerations, spasm, and edema of acute colitis should differentiate infectious colitis from both Crohn's disease and ulcerative colities.

4610 A PROSPECTIVE STUDY OF APPENDECTOMY AND PREDISPOSITION TO CANCER.

(E.) Moertel, C. G.; Nobrega, F. T.; Elveback, L. R.; Wentz, J. R. (Mayo Clin., Rochester, Minn.). *Surg. Gynecol. Obstet.* 138(4):549-553, 1974.

The incidence of cancer among 1779 patients who underwent appendectomy between 1925 and 1944 was compared with that among 1943 controls who had never undergone appendectomy. The appendectomy patients included 697 in whom the operative indication was acute appendicitis and 617 in whom it was chronic appendicitis. A total of 386 people in the two groups developed cancer. There was no meaningful difference in the overall occurrence of cancer between the two groups, and the standard morbidity ratios for the two groups showed close agreement. Neither the age at appendectomy nor the occurrence of chronic versus acute appendicitis was correlated with increasing risk of cancer. In addition, there was no evidence that tonsillectomy alone or in combination with appendectomy had any influence on the occurrence of cancer. The practice of incidental appendectomy during abdominal surgical procedures should be continued whenever this can be done conveniently without increasing operative risk.

4611 MANAGEMENT OF PSEUDO-OBSTRUCTION OF THE COLON.

(E.) Norton, L.; Young, D.; Scribner, R. (Denver Gen. Hosp., Colo.). *Surg. Gynecol. Obstet.* 138(4):595-598, 1974.

Pseudo-obstruction of the right colon (Ogilvie's syndrome) with splitting of the *teniae coli* in the right colon was encountered in 4 male alcoholics, aged 41-66 yr, who had been hospitalized for nonabdominal disease. Symptoms included abdominal distension, in some cases without pain, vomiting, or tenderness. Roentgenograms of the abdomen showed a distended colon without air-fluid levels; the distribution of colonic gas was segmental. The degree of small intestinal distension was variable. Moderate leukocytosis and normal serum electrolytes were noted in all 4 patients. The significant difference between these patients and others reported to have Ogilvie's syndrome is that all 4 of these patients had longitudinal splitting of *teniae coli* along the right colon. In one patient the mucosa had perforated and bulged through the separated *teniae* fibers. In the other 3, no perforation was evident, but the extruded mucosa probably formed an inadequate barrier to coliform organisms passing from the intestinal lumen into the peritoneal cavity. This is suggested by the course of one patient whose intestine was not resected after the split *teniae* were repaired. This patient apparently died of sepsis resulting from peritonitis. Colectomy and fecal diversion by ileostomy are recommended for patients with pseudo-obstruction of the colon and splitting of the *teniae coli*.

4612 PERSISTENT ENTEROCUTANEOUS FISTULA ASSOCIATED WITH INTRAPERITONEAL METALLIC MERCURY.

(E.) Efrusy, M. E.; Dobbins, III, W. O. (George Washington Univ. Med. Ctr., Washington, D. C.). *Am. J. Dig. Dis.* 19(4):373-377, 1974.

A 52-yr-old black female was admitted to the hospital for evaluation of an ileocolocutaneous fistula to the left lower abdomen associated with a purulent discharge. Four years previously she had had a partial colectomy with an ileosigmoid anastomosis for treatment of bleeding diverticulosis coli: the postoperative period was complicated by wound infection requiring drainage and paralytic ileus requiring decompression with a Cantor tube. A mercury-containing balloon attached to the Cantor tube apparently ruptured 2 days after intubation when a scout film of the abdomen revealed a very dense radiopaque material, believed to be mercury, free in the peritoneal cavity. Laboratory data at the later hospital admission were normal. A plain film, however, showed metallic densities in the left lower abdomen. At sigmoidoscopic examination several small globules of mercury were seen in the rectum; the mercury was also grossly visible on histological sections. The patient was treated conservatively and discharged. Six weeks later, she returned stating that the fistula continued to drain intermittently. Blood mercury levels were 20 μg/100 ml, normal being 0 to 7 μg. There was no evidence of systemic toxicity in this patient. While metallic mercury is harmless in the intact gut, it can have adverse effects when it gains entrance to the peritoneal cavity through a break in the mucosa of the intestinal tract.

4613 APPENDICEAL INTUSSUSCEPTION: AN UNUSUAL CAUSE OF PAINLESS RECTAL BLEEDING. *(E.)* Brewer, R. J.; Wangensteen, S. L. (Univ. Virginia Med. Ctr., Charlottesville). *Am. Surg.* 40(5): 319-320, 1974.

A case of intermittent painless rectal bleeding caused by intussusception of the appendix is presented. The patient, a 24-year-old woman, presented with bloody diarrhea, tachycardia, dizziness, and syncope. The only abnormal laboratory finding was a hematocrit of 30. Proctoscopy, air contrast barium enema, barium swallow, and upper gastrointestinal series demonstrated no abnormalities. Five months later, the patient returned with bloody stools; again, no abnormalities were demonstrated. Eight months after that, she again presented with bloody diarrhea. An air contrast barium enema demonstrated a polypoid mass which was intracecal at first, then extracecal, suggesting that an intussusception of the appendix had been reduced during the procedure. Because an intracecal mass was palpated at laparotomy, the terminal ileum and cecum were resected, and an end-to-side ileocolostomy was performed; the patient had no further rectal bleeding. Pathological examination of the appendix revealed a mucosal ulcer and two polypoid projections in the proximal lumen of the markedly thickened appendix. The polypoid areas and mucosal ulcer showed acute and chronic inflammation.

4614 SYMPTOMATIC MUCOCELE OF THE APPENDIX DIAGNOSED PREOPERATIVELY. *(E.)* Koster, L. H. (Western Pennsylvania Hosp., Pittsburgh). *Am. J. Surg.* 127(5):582-584, 1974.

An unusual case of preoperatively diagnosed mucocele of the appendix is presented. The patient, a 39-year-old male, was admitted to the hospital because of severe pain and tenderness in the right lower abdominal quadrant without nausea, vomiting, or diarrhea. Guarding was present, bowel sounds were hypoactive and, on rectal examination, a rigid, smooth, slightly tender mass was palpable on the right. Several small lateral calcifications on the right side of the abdomen were detected in a flat plate of the abdomen. The appendix did not fill during a barium enema, and there was reflux into the terminal ileum. The appendix was retrocecal and acutely inflammed at operation. A diagnosis of acute appendicitis and proximal mucocele of the appendix with fibrosis and focal calcification was established on pathological examination. It is important that mucocele be recognized before surgery since it is necessary to avoid spillage of the cystic contents at operation. These lesions may be malignant, and error might result in the formation of multiple cysts and intestinal obstruction.

4615 BLADDER DYSFUNCTION: A SIGN OF OCCULT COLONIC CARCINOMA. *(E.)* Kase, S.; Goldfarb, M. (no affil.). *Dis. Colon Rectum* 17(2): 238-240, 1974.

Persistent antecedent urinary tract symptoms and no gastrointestinal symptoms were observed in 15 patients who were finally found to have colonic carcinoma. Thirteen of the 15 patients had rectal or sigmoidal lesions. Only 2 patients were finally diagnosed as having right colonic carcinomas. Ages ranged from 54 to 76 years (average 65 years). The urologic symptoms included prostatitis, uremia, pyuria, persistent cystitis, frequency, nocturia, poor stream, urinary retention, and hematuria. The colonic carcinoma was treated by: sigmoidal resection (10 cases), right colectomy (2 cases), abdominoperineal resection (2 cases), and no surgery (1 case). The similarity in innervation, overlap of vascular supply, and the juxtaposition of the anatomy between the lower urinary tract and the lower bowel tend to make these organ systems interrelated in many clinical syndromes. All patients who present with intractable pyuria, recurrent prostatitis, or recurrent hematuria with no obvious urologic disease should undergo lower gastrointestinal investigation to rule out carcinoma of the colon.

4616 TUMOR-LIKE LESIONS OF THE CECUM FOLLOWING INVERSION OF THE APPENDIX. *(E.)* Mylarniemi, H.; Perttala, Y.; Peltokallio, P. (2nd Dept. Surg., Univ. Helsinki, Finland). *Am. J. Dig. Dis.* 19(6):547-556, 1974.

4617 PRIMARY ADENOCARCINOMA OF THE VERMIFORM APPENDIX. *(E.)* Cohen, S. E.; Wolfman, Jr., E. F. (Univ. California Sch. Med., Davis). *Am. J. Surg.* 127(6):704-707, 1974.

4618 BLEEDING DIVERTICULOSIS IN PATIENTS ON ORAL ANTICOAGULANTS. *(E.)* Parsa, F.; Wilson, S. E. (VA Wadsworth Hosp. Ctr., Los Angeles, Calif.). *Am. J. Surg.* 127(6):708-710, 1974.

4619 GIANT SIGMOID DIVERTICULUM WITH PERFORATION. *(E.)* Sutorius, D. J.; Bossert, J. E. (VA Hosp., Cincinnati, Ohio). *Am. J. Surg.* 127(6):745-748, 1974.

4620 ACUTE DIVERTICULITIS OF THE CECUM. *(E.)* Bell, G. A. (no affil.). *Am. Surg.* 40 (6):370-372, 1974.

4621 SOLITARY DIVERTICULUM OF THE COLON. *(E.)* Bushkin, F. L.; Echevarria, R. A. (Univ.

Florida Coll. Med., Gainesville). *Am. Surg.* 40(6): 378-380, 1974.

4622 HUMAN FECAL FLORA: THE NORMAL FLORA OF 20 JAPANESE-HAWAIIANS. *(E.)* Moore, W. E. C.; Holdeman, L. V. (Anaerobic Lab., Virginia Polytechnic Inst. State Univ., Blacksburg). *Appl. Microbiol.* 27 (5):961-979, 1974.

4623 HISTOCHEMICAL STUDY ON THE AUTONOMIC NERVOUS SYSTEM IN THE INTESTINAL TRACT OF HIRSCHSPRUNG'S DISEASE. *(E.)* Morimoto, T. (Fac. Med., Kyushu Univ., Fukuoka, Japan). *Brain Nerve* 26(3):325-329, 1974.

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4625 A CRITICAL REVIEW OF MANAGEMENT OF 392 COLONIC AND RECTAL INJURIES. *(E.)* Bartizal, J. F.; Boyd, D. R.; Folk, F. A.; Smith, D.; Lescher, T. C.; Freeark, R. J. (Cook County Hosp., Chicago, Ill.). *Dis. Colon Rectum* 17(3):313-318, 1974.

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4628 AUTOAMPUTATION OF BENIGN AND MALIGNANT COLONIC POLYPS: REPORT OF TWO CASES. *(E.)* Paul, Jr., R. E.; Gherardi, G. J.; Miller, H. H. (New England Ctr. Hosp., Boston, Mass.). *Dis. Colon Rectum* 17(3):331-335, 1974.

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4631 INTERNAL HEMORRHOIDECTOMY BY ELASTIC LIGATION. *(E.)* Gehamy, R. A.; Weakley, F. L. (Cleveland Clin. Fdn., Ohio). *Dis. Colon Rectum* 17(3):347-353, 1974.

4632 RECURRENT JAUNDICE AND MASSIVE BLOODY DIARRHEA IN A 55-YEAR-OLD FEMALE. *(E.)* Hagel, F. K.; Stolte, M.; Rosch, W. (Med. Clin., Polyclin., Univ. Erlangen, Germany). *Acta Hepatogastroenterol.* 21(2):161-165, 1974.

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4635 MALIGNANT MELANOMA OF THE RECTUM IN A NEGRO MAN: REPORT OF A CASE AND REVIEW OF THE LITERATURE. *(E.)* Hambrick, E.; Abcarian, H.; Smith, D.; Keller, F. (Cook County Hosp., Chicago, Ill.). *Dis. Colon Rectum* 17(3):360-364, 1974.

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4648 A HAMSTER MODEL FOR LINCOMYCIN COLITIS. *(E.)* Humphrey, C. D.; Pittman, J. C.; Pittman, F. E. (Med. Univ. South Carolina, Charleston). *Gastroenterology* 66(4):847, 1974.

4649 ACUTE INTESTINAL OBSTRUCTION FROM TRICHOBEZOAR IN THE SIGMOID COLON: CASE REPORT. *(E.)* Case, T. C. (no affil.). *J. Am. Geriatr. Soc.* 22(6):284-285, 1974.

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4660 COLONOSCOPIC POLYPECTOMY. *(E.)* Sivak, Jr., M. V.; Sullivan, Jr., B. H.; Weakley, F. L.; Rankin, G. B. (Cleveland Clin. Fdn., Ohio). *Am. J. Dig. Dis.* 19(4):339-343, 1974.

4661 RETICULUM CELL SARCOMA OF THE LARGE INTESTINE. THE ROLE OF FIBEROPTIC COLONOSCOPY. *(E.)* Greene, F. L.; Livstone, E. M.; McAllister, Jr., W. B.; Passarelli, N. M.; Troncale, F. J. (Yale Univ. Sch. Med., New Haven, Conn.). *Am. J. Dig. Dis.* 19(4):379-384, 1974.

4662 USE OF ROUTINE GASTROSTOMY IN LEFT-COLONIC SURGERY. *(E.)* Manson, R. R.; Thow, G. B. (Carle Clin., Urbana, Ill.). *Dis. Colon Rectum* 17(2):145-152, 1974.

4663 HYPERPLASTIC (METAPLASTIC) POLYPS OF THE APPENDIX. REPORT OF 19 CASES. *(E.)* Qizilbash, A. H. (Henderson Gen. Hosp., Hamilton, Ontario, Canada). *Arch. Pathol.* 97(6):385-388, 1974.

4664 AN UNUSUAL CASE OF AGANGLIONIC MEGACOLON. *(E.)* Horovitz, I. L.; Baier, I. (Rothschild Univ. Hosp., Haifa, Israel). *Dis. Colon Rectum* 17(2):249-253, 1974.

4665 ALTERNATIVES IN MANAGEMENT OF VOLVULUS OF THE SIGMOID COLON. REPORT OF FOUR CASES. *(E.)* Greco, R. S.; Dragon, R. E.; Kerstein, M. D. (Yale Univ. Sch. Med., New Haven, Conn.). *Dis. Colon Rectum* 17(2):241-245, 1974.

4666 VOLVULUS OF THE SIGMOID COLON IN DELHI, INDIA. *(E.)* Gulati, S. M.; Grover, N. K.; Tagore, N. K.; Taneja, O. P. (Maulana Azad Med. Coll., New Delhi, India). *Dis. Colon Rectum* 17(2): 219-225, 1974.

4667 PERITONITIS RESULTING FROM RUPTURE OF THE LEFT COLON DURING A BARIUM ENEMA FOR CANCER OF THE TRANSVERSE COLON. SUBTOTAL COLECTOMY. *(Fr.)* Gabrielle, C.; Devillard, J.; Devillard, P. (Val Fleuri Clin., Macon, France). *Lyon Chir.* 70(1):57-58, 1974.

4668 OSTOMIES: THEIR ESTABLISHMENT, COMPLICATIONS, AND MANAGEMENT. *(Ger.)* Farthmann, E.; Koch, G. (Surg. Clin., Univ. Hamburg-Eppendorf, Germany). *Med. Welt* 24(41):1577-1579, 1973.

4669 STUDIES ON ANAL FUNCTION IN CONTINENT AND INCONTINENT PATIENTS. *(E.)* Ihre, T. (Karolinska Inst., Stockholm, Sweden). *Scand. J. Gastroenterol.* 9(Suppl. 25):1-64, 1974.

4670 COLORECTAL CARCINOMA AT THE LAHEY CLINIC, 1962-1966. *(E.)* Corman, M. L.; Swinton, N. W.; O'Keefe, D. D.; Veidenheimer, M. C. (Lahey Clin. Fdn., Boston, Mass.). *Lahey Clin. Found. Bull.* 23(2):41-48, 1974.

4671 UNCOMPLICATED FOREIGN BODIES OF THE APPENDIX IN CHILDREN: RADIOLOGIC OBSERVATIONS. *(E.)* Kassner, E. G.; Mutchler, Jr., R. W.; Klotz, Jr., D. H.; Rose, J. S. (Downstate Med. Ctr., Brooklyn, N.Y.). *J. Pediatr. Surg.* 9(2):207-212, 1974.

See also 4343, 4375, 4376, 4382, 4392, 4395, 4396, 4401, 4403, 4405, 4409, 4411, 4412, 4433, 4436, 4444, 4445, 4447, 4457, 4516, 4550, 4558, 4561, 4570, 4584, 4604, 4677, 4680, 4700, 4913, 4927, 4970.

LARGE INTESTINE

Ulcerative Colitis

4672 PROPERTIES OF STRAINS OF ESCHERICHIA COLI CARRIED IN DIFFERENT PHASES OF ULCERATIVE COLITIS. *(E.)* Cooke, E. M.; Ewins, S. P.; Hywel-Jones, J.; Lennard-Jones, J. E. (St. Bartholomew's Hosp., London, England). *Gut* 15(2):143-146, 1974.

Strains of *Escherichia coli* from the feces of patients with active ulcerative colitis and with colitis in remission were examined for hemolysin and necrotoxin production. Cultures from 63 patients with active colitis grew hemolytic *E. coli* in 23 (37%) as compared with 24 (21%) from 115 patients whose disease was in remission. The corresponding proportions for necrotoxin producing strains were 22% and 12%. Of 35 patients investigated both in relapse and remission of the colitis, 14 changed their carriage of hemolytic *E. coli*. Of these 14, 13 carried hemolytic organisms in relapse but not in remission and 1 carried hemolytic organisms in remission but not in relapse. At weekly intervals for 28 weeks, strains of *E. coli* were also examined from specimens of feces from 19 patients. In 4 patients who developed a relapse of the disease during this time, the acquisition of hemolytic or necrotoxic *E. coli* strains followed rather than preceded the onset of the attack. Hemolytic and necrotoxic strains were found most often among these 19 patients when blood was regularly present in the feces. These results suggest that conditions in the bowel during a relapse of colitis favor the presence of hemolysin- and necrotoxin-producing organisms, rather than that these organisms cause the relapse. Of 50 strains of *E. coli* from patients treated with sulphasalazine tested for sensitivity to sulfapyridine, 49 were resistant. No clear relation was established between the activity of the colitis and the presence of any of the 27 serotypes of *E. coli* examined.

4673 TOTAL BODY WATER AND TOTAL EXCHANGEABLE SODIUM IN PATIENTS AFTER ILEORECTAL ANASTOMOSIS. *(E.)* Hill, G. L.; Watts, J. McK.; Iseli, A.; Clarke, A. M.; Hughes, E. S. R. (Univ. Otago Med. Sch., Dunedin, New Zealand). *Br. J. Surg.* 61(3):189-192, 1974.

Total body water and total exchangeable sodium were measured in 29 patients (14 males and 15 females, aged 21-74 yr) who had undergone subtotal colectomy with ileorectal anastomosis for chronic ulcerative colitis more than 1 yr previously and in a control group of 28 persons. There was no significant difference in the state of hydration or in the total exchangeable sodium between the patients and the controls. No significant difference in the 24-hr urinary volume and sodium excretion was noted in either group.

These findings contrast with dehydration and sodium depletion previously demonstrated in ileostomy patients. Fecal loss of sodium in patients with ileorectal anastomosis was less than in patients with ileostomies. These findings suggest that ileorectal anastomosis carries with it less risk of long-term fluid and electrolyte depletion than ileostomy. It is suggested that in patients with ileorectal anastomosis the rectum retains some useful absorptive function.

4674 HL-A-W27 -- A USEFUL DISCRIMINATOR IN THE ARTHROPATHIES OF INFLAMMATORY BOWEL DISEASE. *(E.)* Morris, R. I.; Metzger, A. L.; Bluestone, R.; Terasaki, P. I. (Wadsworth Hosp. Ctr., Los Angeles, Calif.). *N. Engl. J. Med.* 290(20):1117-1120, 1974.

The relation between the W27 antigen and the arthropathy associated with inflammatory bowel disease, i.e., peripheral joint inflammation and spondylitis, was studied in a group of 31 patients with either Crohn's disease or chronic ulcerative colitis, with or without arthritis. Only the patients with inflammatory bowel disease and spondylitis had the W27 antigen (6 of 8 cases) compared to a 6% frequency of the antigen in 267 white controls. In addition, 2 patients with spinal involvement (both W27 positive) had a peripheral seronegative arthropathy associated with the inflammatory bowel disease. Iritis was present in 4 (all W27 positive) of 8 patients with spondylitis and in 1 (W27 negative) of 23 without spondylitis. Thus, 50% of the patients with inflammatory bowel diseases and spondylitis had iritis as opposed to 4% of the subjects without spondylitis. Of 5 patients with iritis, 4 had spondylitis and were W27 positive. These data strongly support the clinical impression that these are 2 distinct arthropathies with differing pathogenetic mechanisms. It is suggested that the presence of peripheral arthritis alone may arise due to some hypersensitivity phenomenon related to bowel inflammation. The development of iritis may result from the association of iritis with W27-positive ankylosing spondylitis rather than from an extraintestinal manifestation of the primary disease. It is projected that ankylosing spondylitis may develop in nearly half of the W27 positive population with ulcerative colitis, whereas 1 of 6 W27-positive patients with Crohn's disease may progress to spondylitis. Thus W27 antigen is a useful clinical discriminator between the arthropathies of inflammatory bowel disease and may define patients markedly at risk of developing spondylitis and perhaps iritis, but not peripheral arthritis.

4675 ARTHRITIS ASSOCIATED WITH INFLAMMATORY BOWEL DISEASE IN CHILDREN. *(E.)* Lindsley, C. B.; Schaller, J. G. (Univ. Washington Med. Sch., Seattle). *J. Pediatr.* 84(1):16-20, 1974.

Arthritis occurred in 23 of 136 (17%) children and teenagers with inflammatory bowel disease, in 18 of 86 (21%) patients with ulcerative colitis, and 5 of 50 (10%) with granulomatous bowel disease. Peripheral arthritis occurred in 18 children which characteristically affected only a few large joints and was of brief duration and benign outcome. Spondylitis occurred in 5 boys and was progressive and inseparable clinically from ankylosing spondylitis. There was little relation between the occurrence of arthritis and the severity of the underlying bowel disease. Anemia and growth retardation occurred frequently. Mucocutaneous lesions were associated with peripheral arthritis but not with spondylitis. No patient had iridocyclitis. The possibility of bowel disease should be considered in children presenting with arthritis, particularly if few joints are involved and episodes of arthritis are transient, and particularly if gastrointestinal complaints, mucocutaneous lesions, anemia, or growth retardation are associated with pauciarticular arthritis. In children with arthritis and inflammatory bowel disease, the possibility of ankylosing spondylitis should be considered and radiographs of the sacroiliac joints followed. Therapy for the peripheral arthritis of inflammatory bowel disease consists of recognition of the generally benign nature of this complication and treatment of the underlying bowel disease. Spondylitis of inflammatory bowel disease, however, does not regress; and early recognition and appropriate therapy of the arthritis with anti-inflammatory drugs and physical therapy are necessary to prevent ultimate musculoskeletal deformity.

4676 IMMUNOSUPPRESSION IN THE TREATMENT OF INFLAMMATORY BOWEL DISEASE. I. CHANGES IN LYMPHOID SUB-POPULATIONS IN THE BLOOD AND RECTAL MUCOSA FOLLOWING CESSATION OF TREATMENT WITH AZATHIOPRINE. *(E.)* Campbell, A. C.; Skinner, J. M.; Hersey, P.; Roberts-Thomson, P.; MacLennan, I. C. M.; Truelove, S. C. (Radcliffe Infirm., Oxford, England). *Clin. Exp. Immunol.* 16(4):521-533, 1974.

Lymphoid subpopulations in the blood and rectal mucosa were studied in 3 patients with ulcerative colitis and 3 with Crohn's disease who had been treated for 3 to 4 1/2 yr with 100-150 mg/day azathioprine. Serial assays were performed to observe the changes occurring up to 12 weeks after treatment with azathioprine was discontinued. While the patients were on the drug, 2 lymphoid populations were markedly depressed. These were the plasma cells of the rectal lamina propria and blood lymphocytes with cytotoxic activity against antibody-sensitized target cells ('K' cells). After discontinuation of azathioprine, both populations rapidly increased to near normal levels by 12 weeks. Most of the recovery occurred within 3 to 5 weeks. There was no significant change in circulating immunoglobulin-staining cells which could be attributed to the drug. Nor was azathioprine shown to have any effect on the mitotic response of lymphocytes to phytohemagglutinin. Three patients, however, gave very low or erratic responses to phytohemagglutinin, which may have been related either to their disease or to steroid therapy (2 were receiving prednisolone p.o. and 1 was using predsol enemas). It is suggested that the cytotoxic action of azathioprine is most pronounced on rapidly proliferating cell populations such as antibody-dependent cytotoxic lymphocytes and plasma cells.

4677 TOXIC MEGACOLON IN ULCERATIVE COLITIS. *(E.)* Binder, S. C.; Patterson, J. F.;

Glotzer, D. J. (Tufts Univ., Boston, Mass.). *Gastroenterology* 66(5):909-915, 1974.

Of a total of 220 patients treated for ulcerative colitis between 1961 and 1973, 18 (13 men and 5 women, aged 18-69 yr) developed toxic megacolon. Diagnosis was established by clinical examination, sigmoidoscopy, and the appearance of plain roentgenograms of the abdomen. Fluid, electrolyte, and serum albumin deficits were corrected; transfusions were given as needed for anemia; and systemic antibiotics and parenteral steroids (300-400 mg/day hydrocortisone or 40-80 U/day adrenal corticotropin) were administered to all but 5 patients who were operated on immediately because of suspected or actual perforation. Only 1 patient improved sufficiently on medical therapy so that surgery was not required. Two other patients recovered for a short time before recurrence of toxic megacolon necessitated surgery. The colon was perforated at surgery in 3 patients and perforated during surgery in 2 others. Subtotal colectomy, ileostomy, and sigmoid mucous fistula were performed on 7 patients subtotal colectomy, ileostomy, and Hartmann turn-in of the rectal stump on 2; and total proctocolectomy with ileostomy was performed on 8. In contrast to the average reported mortality of 23.1% in patients with ulcerative colitis who develop toxic megacolon, only 1 (5.6%) of these patients died. Death resulted from bone marrow aplasia and resultant hemorrhagic diathesis secondary to chloromycetin therapy administered for generalized sepsis. Sepsis was responsible for 7 of the 10 major complications attributed directly to the operation. All patients who survived surgery are alive and well 1-13 yr later. Early surgical intervention is advocated for these patients to prevent colonic perforation and progressive metabolic deterioration that prolonged medical management may produce. Colectomy, rather than decompressive enterostomy, is recommended as the procedure of choice.

4678 HIGH DOSE PREDNISONE TREATMENT IN SEVERE ULCERATIVE COLITIS.

(E.) Kristensen, M.; Koudahl, G.; Fischerman, K.; Jarnum, S. (Rigshospital, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(2):177-183, 1974.

High dose prednisone therapy (80-160 mg/day) with supportive blood transfusions and infusions of serum proteins, amino acids, and electrolytes was given to 31 patients (17 females and 14 males, aged less than 20 to over 60) with acute life-threatening ulcerative colitis of less than 3 months up to 2 yr duration. Therapy was continued for a period of 1 to 12 months, (average 5 months). Of the 31 treated patients, 14 went into remission. In 17 patients the therapy failed and colectomy was performed. Of the 17, 9 were subjected to 'acute' operation because of increasing hemorrhage, toxic megacolon, suspected perforation, or rapid clinical deterioration. There were 4 deaths: 3 patients died postoperatively and 1 responded to steroid therapy but died of pulmonary embolism. During the follow-up study, which ranged from ½ to 7 yr, 3 patients who responded initially to prednisone treatment were operated upon. Intensive medical therapy including a high dose prednisone treatment in severe acute ulcerative colitis appeared justified since it saved the colon in 45% of the cases. However, meticulous surveillance, experience, and close collaboration between internist and surgeon are prerequisites for this type of treatment.

4679 ULCERATIVE COLITIS IN THE JEWISH POPULATION OF TEL-AVIV JAFO. I. EPIDEMIOLOGY.

(E.) Gilat, T.; Ribak, J.; Benaroya, Y.; Zemishlany, Z.; Weissman, I. (Ichilov Hosp., Tel-Aviv, Israel). *Gastroenterology* 66(3):335-342, 1974.

An epidemiological study of ulcerative colitis was performed in the Jewish population of Tel-Aviv Jafo during the period from 1961 to 1970. The annual incidence rate averaged $3.66/10^5$ population, and the prevalence was $37.4/10^5$. These figures are significantly lower than those in comparable studies conducted in Oxford, England, Rochester, Minnesota and Copenhagen, Denmark, suggesting that the disease is less frequent in Jews in Tel-Aviv. The disease was most prevalent in European and American born members of the Jewish Population in Tel-Aviv (37.3) and, by decreasing order, in Israeli born (25.7), Asian born (18.9), and African born (18.5). The female-male ratio was 0.80; the female-male ratio in the population, 1.004. The age of onset of disease peaked between 15 and 25 yr with a second smaller peak between 30 and 40. While no rise in incidence could be demonstrated over the time period of the study, the annual rate did fluctuate. The percentage of ulcerative colitis patients who were never hospitalized was 14.8%. It is felt that, due to the improved diagnostic methods and earlier diagnosis of the disease, many people are treated as outpatients and never admitted to hospitals. Thus the use of only hospitalized cases in an epidemiological study of ulcerative colitis is not valid.

4680 SURGICAL MANAGEMENT OF TOXIC DILATATION OF THE COLON IN ULCERATIVE COLITIS.

(E.) Scott, Jr., H. W.; Sawyers, J. L.; Gobbel, Jr., W. G.; Graves, H. A.; Shull, H. J. (Vanderbilt Univ. Med. Ctr., Nashville, Tenn.). *Ann. Surg.* 179(5): 647-656, 1974.

After preliminary medical therapy, ileostomy with single- or two-stage proctocolectomy was done in 16 patients (9 women and 7 men, aged 20-65 yr) with ulcerative colitis and toxic dilatation of the colon. There was a single fatality in a patient who had multiple colonic perforations at operation; the patient died in uremia with multiple abscesses, peritonitis, and *Pseudomonas* septicemia. Another patient (an 18-yr-old man) was successfully treated by Turnbull's operation of loop ileostomy with "blow-hole" transverse colostomy. Four of the 16 surviving patients made totally uneventful recoveries with primary healing of wounds and no complications. Two others made equally smooth recoveries except for a mild urinary infection in 1 and transitory per-

al palsy in the other. Recovery in the 10 other
ients was delayed by complications including ab-
inal abscess (5), wound abscess (4), urinary in-
tion (3), rectal bleeding (3), wound dehiscence (2),
ineal infection (2), and coma (2). Follow-up res-
s after 1-10 yr are excellent. Early recognition of
toxic dilatation syndrome in ulcerative colitis is
erative. Resuscitative treatment should be given
a life-threatening emergency basis and should in-
de parenteral fluids, electrolytes, blood, broad
ctrum antibiotics, vitamins, steroids, and naso-
tric suction. Operation, whether ileostomy with
octo)colectomy or Turnbull's procedure, should
carried out urgently after 12-24 hr of resuscita-
e treatment.

1 ENDOSCOPIC AND BIOPSY STUDIES OF THE OESO-
PHAGUS IN ULCERATIVE COLITIS. *(E.)*
ischer, K.; Kasper, H.; Romen, W. (Med. Clin.,
v. Wurzburg, Germany). *Acta Hepatogastroenterol.*
76-79, 1974.

2 RETROGRADE CHOLANGIOGRAPHY AND SCLEROSING
CHOLANGITIS. *(E.)* Abbruzzese, A. A.
ter Bent Brigham Hosp., Boston, Mass.). *Am. J.*
. Dis. 19(6):571-574, 1974.

3 TOTAL INTRAVENOUS NUTRITION IN MANAGEMENT OF
INFLAMMATORY DISEASE OF THE INTESTINAL TRACT.
ORT OF 12 CASES. *(Fr.)* Solassol, C.; Joyeux, H.;
ol, H.; Balmes, J. L.; Cayrol, B.; Favier, C. (St.
i Clin., Montpellier, France). *Arch. Fr. Mal. App.*
. 63(2):115-121, 1974.

4684 THE QUALITY OF LIFE AFTER PROCTOCOLECTOMY AND ILEOSTOMY: A STUDY OF PATIENTS WITH CONVENTIONAL ILEOSTOMIES CONVERTED TO CONTINENT ILEOSTOMIES. *(E.)* Kock, N. G.; Darle, N.; Kewenter, J.; Myrvold, H.; Philipson, B. (Dept. Surg. I, Univ. Goteborg, Sweden). *Dis. Colon Rectum* 17(3):287-292, 1974.

4685 THE COURSE OF GROWTH. RETARDATION IN CHILDREN WITH ULCERATIVE COLITIS. *(E.)* Berger, M.; Gribetz, D.; Korelitz, B. I. (Mt. Sinai Sch. Med., City Univ. New York, N.Y.). *Gastroenterology* 66(4): 665, 1974.

4686 ACETYLATION POLYMORPHISM OF SULFAPYRIDINE AND ITS CONSTANCY IN PATIENTS WITH INFLAMMATORY BOWEL DISEASE. *(E.)* Das, K. M.; Eastwood, M. A. (Western Gen. Hosp., Edinburgh, Scotland). *Gastroenterology* 66(4):681, 1974.

4687 FIBROSING ALVEOLITIS AND TREATMENT WITH SULPHASALAZINE. *(E.)* Davies, D.; MacFarlane, A. (Ransom Hosp., Mansfield, England). *Gut* 15(3):185-188, 1974.

See also 4374, 4375, 4383, 4391, 4392, 4400, 4424, 4458, 4604, 4902, 4951, 4957, 4966, 4970.

PANCREAS

8 NEW ONCOFETAL ANTIGEN FOR HUMAN PANCREAS.
(E.) Banwo, O.; Versey, J.; Hobbs, J. R.
stminster Hosp. Med. Sch., London, England).
cet 1(7859):643-645, 1974.

isera against stabilized homogenates of whole
an fetal pancreas were raised in rabbits and ab-
bed with normal adult pancreas and albumin. By
-dimensional immunoelectrophoresis in agarose
taining antiproteases, a characteristic peak was
wn in sera from 36 of 37 patients with carcinoma
the pancreas. It was also found against ex-
cts of fetal pancreas or adult pancreatic carcino-
. It was absent from sera of 38 other patients,
luding those with gut cancers (8 positive for
lonic carcinoembryonic antigen), hepatoma (2 posi-
e for α-fetoprotein), other causes of jaundice
), and acute (5) or chronic (12) pancreatitis.
was absent in extracts of fetal colon and fetal
er. Thus far the adsorbed antisera seem to de-
t an oncofetal antigen complex specific to pan-
as.

9 ULTRASTRUCTURAL STUDY OF INTRANUCLEAR
INCLUSIONS IN THE EXOCRINE PANCREAS IN
REYE'S SYNDROME. *(E.)* Collins, D. N. (New York State Dept. Health, Albany). *Lab Invest.* 30(3):333-340, 1974.

Electron microscope studies of organs from a child dying of Reye's syndrome led to the finding of previously unreported intranuclear inclusions in the pancreatic acinar cells. These bizarre inclusions were of varying size, number, and shape and occasionally presented a laminated appearance. They did not resemble any known infectious agent, although adenovirus type 2 was simultaneously isolated from the adrenal gland. Similar intranuclear inclusions were subsequently identified in pancreases obtained from 4 other documented cases of Reye's syndrome. Many lipid globules were present in the cytoplasm of hepatocytes and cells of the renal tubules and in the vascular epithelium of an abdominal lymph node, in the spleen and in adrenal and salivary glands. Although acinar cell nuclei of the salivary gland contained pseudoinclusions consisting of inverted nuclear membranes enclosing fragments of rough endoplasmic reticulum, no true inclusions were observed with characteristics similar to those in the pancreas. The pancreatic inclusions can be identified by light microscopy and may be a characteristic of Reye's syndrome. They were not found by light or electron microscopy in the pancreases from 3 children dying of unrelated diseases. It is hypothesized that the inclusions originate from cytoplasmic invaginations formed as a response to toxic injury of pancreatic acinar cells.

4690 CHEMOTHERAPY IN PANCREATIC CARCINOMA: 5 FLUOROURACIL (5FU) AND 1,3 BIS-(2 CHLORETHYL)-1-NITROSOUREA (BCNU). *(E.)* Lokich, J.; Chawla, P. L.; Brooks, J.; Frei, III, E. (Peter Bent Brigham Hosp., Boston, Mass.). *Ann. Surg.* 179(11):450-453, 1974.

Twenty patients with pancreatic carcinoma were given a 5-day course of 5-fluorouracil (10 mg/kg/day i.v.) followed by a 5-day course of 1,3 bis-(2 chlorethyl)-1-nitrosourea (40 mg/m^2/day i.v.). The 5-day courses were repeated at 6-8 week intervals. In 3 of the 20 patients the diagnosis was made by closed liver biopsy and no operative procedure was undertaken. Surgical bypass was performed in 7 patients, total pancreatectomy in 3, partial pancreatectomy in 1, and exploratory laparatomy with biopsy only in 6. Therapeutic responses could not be evaluated because of early death in 5 cases. Two patients had complete regression (lasting 31 and 13 months, resp.) as represented by total normalization of the liver scan and ultrasound examination and disappearance of intra-abdominal masses. Partial response (more than 50% tumor regression) was observed in 2 patients and persisted for 6 and 3 months, resp. In addition, stabilization occurred in 5 patients with lack of clinical progression for 3-12 months. Thus, 9 of 15 patients (60%) were clinically palliated by the administration combined chemotherapy. Toxicity, consisting primarily of gastrointestinal manifestations and bone marrow suppression, was less than that observed with the same agents administered alone.

4691 EXOCRINE PANCREATIC INSUFFICIENCY, NEUTROPENIA, METAPHYSEAL DYSTOSIS, AND GROWTH RETARDATION (SHWACHMAN'S SYNDROME) WITH TRANSIENT DISORDER OF CARBOHYDRATE METABOLISM. *(Ger.)* Beyreiss, K. (Pediatr. Clin., Karl Marx Univ., Leipzig, Germany). *Z. Gesamte Inn. Med.* 20(8):337-339, 1974.

4692 PATHOLOGY OF ULCEROGENIC AND DIARRHEOGENIC TUMORS OF THE PANCREAS. *(E.)* Tomita, T. (Washington Univ. Sch. Med., St. Louis, Mo.). *Acta Pathol. Jap.* 24(2):189-205, 1974.

4693 CARCINOEMBRYONIC ANTIGEN (CEA)-LIKE ACTIVITY IN PANCREATIC JUICE OF PATIENTS WITH PANCREA TIC CARCINOMA AND PANCREATITIS. *(E.)* Sharma, M. P.; Gregg, J. A.; McCabe, R. P.; Loewenstein, M. S.; Lurie B. B.; Zamcheck, N. (Boston City Hosp., Mass.). *Gastr enterology* 66(4):776, 1974.

4694 SUCCESSFUL TREATMENT OF "PANCREATIC CHOLERA" BY STREPTOZOTOCIN. *(E.)* Schein, P.; Kahn, C. R.; Levy, A. G.; Gorden, P.; Gardner, J. D. (no affil.). *J. Clin. Invest.* 53(6):269, 1974.

See also 4372, 4377, 4382, 4396, 4399, 4418, 4426, 4437, 4442, 4518, 4870.

PANCREAS

Pancreatitis

4695 INTESTINAL MUCOSAL DISACCHARIDASES IN CHRONIC PANCREATITIS. *(E.)* Arvanitakis, C.; Olsen, W. A. (Kansas Univ. Med Ctr., Kansas City). *Am. J. Dig. Dis.* 19(5):417-421, 1974.

Disaccharidase activity was measured in the mucosa of the small intestine in 9 men, aged 42-50 yr, with chronic relapsing pancreatitis related to alcohol and in 6 men, aged 45-58 yr, with no evidence of gastrointestinal, pancreatic, or liver disease. A similar study was conducted in 6 men, aged 50-63 yr, with diabetes mellitus to rule out the possibility that diabetes, rather than pancreatic disease, accounted for the results. At the time of the study all of the patients with chronic pancreatitis were entirely asymptomatic, were eating a normal diet, and had normal serum amylase values. None of the patients was receiving pancreatic enzyme therapy. Sucrase and maltase activities were significantly higher in patients with chronic pancreatitis than in controls. They averaged 98 ± 7 μmol sucrose hydrolyzed/min/g protein *versus* 48 ± 9 in controls and 233 ± 10 μmol maltose hydrolyzed/min/g protein *versus* 163 ± 23 in controls. Lactase levels were the same in both groups. Patients with diabetes had, if anything, enzyme activities which were lower than those of the controls. Since nearly all of these patients had pancreatic insufficiency, it is suggested that a decrease in the intraluminal concentration of pancreatic enzymes may lead to a decrease in the rate of sucrase and maltase degradation in patients with chronic pancreatitis, allowing these enzymes to accumulate in the brush border membrane.

4696 FACTORS IN THE PATHOGENESIS OF EXPERIMENTAL ACUTE PANCREATITIS IN THE RAT. *(E.)*

st, A.; Dishon, T.; Rosenmann, R.; Boss, J. H. dassah Med. Sch., Hebrew Univ., Jerusalem, Israel). . *Surg. Res.* 5(5):348-361, 1973.

following solutions were injected under pressure o the pancreas of male albino rats via a duodenal ment which had been surgically obstructed: phy- logical saline; a 2% solution of bovine serum al- in (BSA); nephrotoxic serum; normal rabbit serum; ubilized immune complexes of inactivated rabbit i-BSA serum; inactivated rabbit anti-BSA serum; normal rat serum. Some of the rats receiving the ologous or heterologous protein solutions had been viously sensitized to the respective protein. d pancreatitis resulted from the introduction of ine. Pancreatitis also occurred in a group of m-operated, uninjected controls. The administra- n of homologous or heterologous protein solutions uced mild pancreatitis; prior sensitization did aggravate the inflammatory process. The injec- n of nephrotoxic serum or the preformed immune plexes induced severe pancreatitis. The animals eiving normal rabbit serum or anti-BSA serum de- oped mild pancreatitis, as did the animals recei- g normal rat serum. Serological examination of oncentrated and concentrated urine specimens ob- ned from all rats failed to reveal pancreas-speci- antigens. Pancreatitis seems to result from the lux of solutions carrying trypsinogen activators m the duodenum into the ducts at a time when creatic secretion is enhanced by intestinal hor- es. Pancreatic damage results from passage of activated enzymes across the acinar and ductular thelium into the interstitial tissue. The verity of the pancreatitis is augmented when im- e mechanisms are superimposed.

97 FAMILIAL CHRONIC PANCREATITIS ASSOCIATED WITH PANCREATIC LITHIASIS. *(E.)* Sato, Saitoh, Y. (Tohoku Univ. Sch. Med., Sendai, an). *Am. J. Surg.* 127(5):511-517, 1974.

eport is presented of 3 sisters, aged 11, 20, and yr, who had pancreatic lithiasis. Pancreatic hiasis in each patient was confirmed at operation was favorably treated by side-to-side pancreatico- unostomy. The symptoms and the histologic features the pancreas in these patients were similar to se of the usual form of chronic pancreatitis, but mechanism of occurrence of the disease on a fa- ial basis could not be identified. The calcifi- ions observed in these 3 cases did not differ in e from those in patients with nonhereditary di- se. No abnormalities were detected in urinary no acids, parathyroid function, or postheparin olytic activity.

8 CHRONIC PANCREATITIS IN ENGLAND: A CHANGING PICTURE? *(E.)* James, O.; Agnew, E.; Bouchier, I. A. D. (Roy. Free Hosp., London, land). *Br. Med. J.* 2(5909):34-38, 1974.

eview is presented of 107 patients with chronic creatitis from the London area seen between 1968 1973. They comprised 30 with calcific pancrea- is and 77 with chronic or chronic relapsing pancreatitis without calcification. The commonest clinical features were pain, diabetes, malabsorption, and peptic ulcer. Alcohol was a probable etiology in nearly half the cases, a different finding from those of previous surveys and possibly associated with the increased consumption of alcohol in England in the last 20 yr. Biliary tract disease was found in less than 20% of the patients. This study confirms the existence of a small but well-defined group of patients with chronic painless pancreatic disease whose etiology is obscure and in whom malabsorption and diabetes are the principal complaints. There was also a definite association between chronic pancreatitis and duodenal ulcer as 16 patients had both conditions.

4699 ACUTE PANCREATITIS WITH HYPERLIPEMIA: EVIDENCE FOR A PERSISTENT DEFECT IN LIPID METABOLISM. *(E.)* Cameron, J. L.; Capuzzi, D. M.; Zudema, G. D.; Margolis, S. (Johns Hopkins Univ., Sch. Med., Baltimore, Md.). *Amer. J. Med.* 56(4):482-487, 1974.

Lipid metabolism was studied in 22 patients (17 men and 5 women with an average age of 42 yr) with acute pancreatitis and hyperlipemia during a quiescent period. Pancreatitis was attributed to excessive alcohol intake in 21 of these patients. Persistent fasting hypertriglyceridemia was found in 16 and abnormal lipoprotein electrophoretic patterns in 17. In addition, response to a lipid load (250 g corn oil) was abnormal; in 20 of the 22 patients triglyceride levels rose above 500 mg/100 ml and in 10, above 1000 mg/100 ml. The persistence of lipid abnormalities in these patients indicates that such abnormalities are not secondary to acute pancreatitis. The possibility that hypertriglyceridemia has an intermediate role in the pathogenesis of pancreatitis is suggested by abdominal pain developing in 2 patients after their serum triglyceride levels rose above 2500 mg/100 ml. If triglyceride abnormalities play an intermediary role in the development of pancreatitis in a large percentage of alcoholics, as appears likely, monitoring of serum triglyceride levels may offer an approach to the prevention of acute pancreatitis in these patients.

4700 COLONIC NECROSIS COMPLICATING POSTOPERATIVE PANCREATITIS. *(E.)* Katz, P.; Dorman, M. J.; Aufses, Jr., A. H. (Long Island Jewish-Hillside Med. Ctr., New Hyde Park, N.Y.). *Ann. Surg.* 179(4):403-405, 1974.

A 48-yr-old woman underwent cholecystectomy and common duct exploration for chronic cholecystitis, cholelithiasis, and choledocholithiasis. After removal of the stones, there was still no passage of dye into the duodenum and a duodenotomy was performed but was closed since no obstruction was found. On the 2nd postoperative day the patient developed severe abdominal pain, signs of progressive peritonitis, fever, shock and increased serum amylase levels. Abdominal x-ray 12 days later showed mottled air in the mid-abdomen. Laparotomy on the 16th postoperative day revealed a large pancreatic abscess and peritonitis with multiple abscesses including a large pelvic abscess. In the upper portion of the left lumbar gutter, a large abscess surrounded the descending colon in which stool and a piece of necrotic colon were lying free. The abscesses were drained and a colostomy performed in the distal transverse colon. The patient improved on massive doses of antibiotics, fluids, and hyperalimentation until 23 days after surgery when she had a massive retroperitoneal hemorrhage. The next day old blood drained from the colostomy and from all drain sites, after which the patient continued to improve. A sinogram taken at discharge demonstrated a colocutaneous fistula with a sinus tract extending to the left subphrenic space. A subsequent fistulogram revealed closure of the subphrenic tract but an extension to the right side of the pelvis; this extension also gradually healed. The patient was readmitted 9 months later for resection of the fistula and reanastomosis of the colon. Two months later the colostomy was closed and the patient is now well. Hypaque enema may help establish the diagnosis of colonic necrosis. Colostomy and wide drainage of the necrotic area is recommended for prevention of sepsis and/or bleeding.

4701 STATISTICS FROM 76 LEFT PANCREATECTOMIES PERFORMED FOR PANCREATITIS. *(Fr.)* Mallet Guy, P.; de Roissard de Bellet, J. P. (no affil.). *Lyon Chir.* 70(1):11-20, 1974.

4702 RESULTS FROM PANCREATECTOMIES USED TO TREAT CHRONIC PANCREATITIS: 39 CASES. *(Fr.)* Saubier, E. C.; Partensky, C.; Brault, A.; Russo, A.; Barbe, C. (Edouard Herriot Hosp., Lyon, France). *Lyon Chir.* 70(1):21-26, 1974.

4703 GASTRIC STATE IN CHRONIC PANCREATITIS. *(Rus.)* Geller, L. I.; Grishchuk, V. K.; Kazimirchik, A. P.; Petrenko, V. F.; Redko, A. P.; Romanets, V. A.; Sokolov, A. A. (Khabarovsk Med. Inst., USSR). *Vrach. Delo* (4):54-56, 1974.

4704 MOTOR FUNCTION OF THE SMALL INTESTINE IN ACUTE PANCREATITIS. *(Rus.)* Synovets, A. S.; Redchits, P. S. (Odessa Med. Inst., USSR). *Vrach. Delo* (4):57-58, 1974.

4705 CHOLEDOCHAL CYST: AN UNUSUAL CORRECTABLE CAUSE OF PANCREATITIS. *(E.)* Agrawal, R.; Brodmerkel, Jr., G.; Cincala, R. (Allegheny Gen. Hosp., Pittsburgh, Pa.). *Gastroenterology* 66(4):658, 1974.

4706 TRANSGASTRIC NEEDLE ASPIRATION OF PANCREATI PSEUDOCYST THROUGH AN ENDOSCOPE. *(E.)* Rogers, G.; Cicurel, N. J.; Seed, R. W. (Grant Hosp., Chicago, Ill.). *Gastroenterology* 66(4):823, 1974.

4707 CORTICOTROPHIN (ACTH) AND CORTISOL IN BLOOD OF ALCOHOLICS AND OF PATIENTS WITH ACUTE PANCREATITIS. *(E.)* Geokas, M. C.; Rinderknecht, H. (VA Hosp., Los Angeles, Calif.). *Gastroenterology* 66(4):697, 1974.

4708 MARKEDLY ELEVATED ALKALINE PHOSPHATASE (AP) ASSOCIATED WITH CHRONIC PANCREATITIS. *(E.)* Snape, Jr., W. J.; Long, W. B.; Trotman, B. W.; Marin, G. A.; Czaja, A. J. (Univ. Pennsylvania Hosp., Philadelphia). *Gastroenterology* 66(4):780, 1974.

4709 BILE ACID COMPOSITION IN PANCREATIC AND CONTROL SUBJECTS BY 3α- AND 7α-HYDROXYSTEROID DEHYDROGENASE ASSAYS AND A DIRECT SELECTIVE ASSAY FOR TAURINE CONJUGATES. *(E.)* Macdonald, I. A.; Williams, C. N.; Mahony, D. E.; Christie, W. M. (Dept. Med., Dalhousie Univ., Halifax, Nova Scotia). *Gastroenterology* 66(4):802, 1974.

4710 PSEUDOCYST OF THE PANCREAS DUE TO THORACIC TRAUMA IN A CHILD. *(E.)* Tudor, R. B.; (Quain Ramstad Clin., Bismarck, N.D.). *Gastroenterology* 66(4):791, 1974.

See also 4368, 4377, 4381, 4386, 4389, 4399, 4426, 4568, 4693, 4878.

LIVER AND BILIARY TRACT

4711 DEFECTIVE BILIARY EXCRETION OF COPPER IN WILSON'S DISEASE. *(E.)* Frommer, D. J. (Roy. Free Hosp., London, England). *Gut* 15(2):125-129, 1974.

The biliary excretion of copper was measured in 8 patients with Wilson's disease (3 untreated, with hepatic dysfunction) and 10 control subjects (3 with hepatic dysfunction). The duodenum was perfused with an amino acid solution containing a nonabsorbed marker, $^{51}CrCl_3$, and the juice was aspirated from the duodeno-jejunal junction. The mean concentration of copper in the duodenal aspirate in Wilson's disease was significantly lower than in the control group. The mean biliary copper excretion rate in Wilson's disease (8.6 ± 0.8 μg/20 min (SEM)) was also significantly below that of the control group (16.4 ± 0.8 μg/20 min). The presence of liver dysfunction made no significant difference in the excretion rates in either group of patients. The results suggest that the accumulation of copper in Wilson's disease is due to the inability of the liver to excrete copper into the bile in adequate amounts.

4712 SPONTANEOUS RUPTURE OF THE LIVER IN PATIENT USING CONTRACEPTIVE PILLS. *(E.)* Frederick, W. C.; Howard, R. G.; Spatola, S. (St. Vincent's Med.

r., Richmond, Staten Island, N.Y.). *Arch. Surg.*
3(1):93-95, 1974.

sruption of the right lobe of the liver with mas-
ve hemorrhage in a young woman taking oral contra-
ptives was successfully treated by right hepatolo-
ctomy. Postoperative complications included a
bdiaphragmatic abscess which had to be drained and
persistent biliary fistula that closed 4 months af-
r hepatectomy. The patient is now asymptomatic 2
after surgery, and repeated liver scans show pro-
essive regeneration of the liver mass. Pathologic
amination of the resected liver revealed evidence
hepatic vein thrombosis, necrosis, and hemorrhage.
evidence was found of acute congestion and hemor-
age consistent with Chiari's syndrome. In the
sence of any history of trauma, and in view of
e pathologic findings, it is suggested that an
sociation exists between the development of this
ndition and the use of oral contraceptives.

13 A STEREOLOGICAL STUDY OF INTRAHEPATIC BILE DUCTS. 4. CONGENITAL HEPATIC FIBROSIS.

.) Jorgensen, M. (Gentofte Health Inst., Copen-
gen, Denmark). *Acta Pathol. Microbiol. Scand.* [*A*]
(1):21-29, 1974.

e intrahepatic biliary system in congenital hepatic
prosis has been evaluated by means of stereological
amination and reconstructions of 10 liver specimens
om 8 patients. The ductal system consisted of a
aracteristic mixture of different ductal shapes in-
uding very flattened, plate-like ducts. These ducts
re arranged in irregular networks which were
ually organized in separate planes and which often
mpletely or incompletely surrounded blood vessels.
change with age was found in the ductal anatomy.
e biliary system is fundamentally identical in
ngenital hepatic fibrosis and in infantile poly-
stic disease. It is not possible to determine
om the present study whether or not there may be a
nor systematic difference between the ductal le-
ons found in these 2 diseases. The flattened duc-
l shape is considered to result from a failure in
e embryological development of the biliary system.

14 A BIOCHEMICAL ABNORMALITY IN CEREBROTENDINOUS XANTHOMATOSIS. IMPAIRMENT OF BILE
ID BIOSYNTHESIS ASSOCIATED WITH INCOMPLETE DEGRA-
TION OF THE CHOLESTEROL SIDE CHAIN.

(E.)
toguchi, T.; Salen, G.; Tint, G. S.; Mosbach, E.
(Public Health Res. Inst., New York, N.Y.). *J.*
in. Invest. 53(5):1393-1401, 1974.

le acid precursors were sought in bile and feces
3 subjects with cerebrotendinous xanthomatosis.
er 10% of the total sterols excreted in bile and
ces consisted of compounds more polar than chlo-
terol. Chromatographic analysis of the polar
actions in conjunction with gas-liquid chromato-
aphy-mass spectrometry indicated 2 major constit-
nts, 5β-cholestane-3α,7α,12α,25-tetrol and 5β-
olestane-3α,7α,12α,24ξ,25-pentol. After i.v. in-
ction of (4-^{14}C)cholesterol, both bile alcohols
re radioactive, proving that they were derived
om cholesterol. The accumulation of alcohols
droxylated at C-25 and C-24,25 suggests that decreased bile acid synthesis in cerebrotendinous xanthomatosis results from impaired oxidation of the cholesterol side chain. The abnormally high activities of the rate-controlling enzymes of bile acid synthesis can then be ascribed to failure of the bile alcohols to exert negative feedback control on these enzymes either due to the bile alcohols not being absorbed or because they lack the structural requirements to interact with the hepatic regulatory system. Thus, patients with cerebrotendinous xanthomatosis synthesize insufficient quantities of bile acids to maintain the pool size required for normal feedback control of bile acid and cholesterol production. The demonstration of substantial amounts of the tetrol and the pentol and in the feces suggests that the patients lack the enzyme to catalyze the further transformation of the pentol to cholic acid. In any case, the finding of 25-hydroxylated bile alcohols, and the lack of 26-hydroxylated intermediates, may have important implications in the biochemical pathway of bile acid synthesis.

4715 CRYOGLOBULINS IN ACUTE AND CHRONIC LIVER DISEASES.

(E.) Florin-Christensen, A.; Roux, M. E. B.; Arana, R. M. (Ctr. Med. Ed. Clin. Invest., Buenos Aires, Argentina). *Clin. Exp. Immunol.* 16(4):599-605, 1974.

Cryoglobulins were detected in the sera of a group of 13 patients with acute viral hepatitis and in those of a group of 12 patients with chronic liver diseases, including 7 cases of active chronic hepatitis, 3 cases of primary biliary cirrhosis, and 2 cases of cryptogenic cirrhosis. Concentrations of cryoglobulin in the serum ranged from 0.2 to 1 mg/ml. Cryoglobulin preparations from the viral hepatitis patients were partially soluble at 37°C and completely soluble at 40 C while those from chronic liver disease patients were poorly soluble at 37 C and only moderately more soluble at 40 C. Most of the preparations contained mixtures of IgM and IgG or of IgM, IgG, and IgA. Some, however, consisted of single-class immunoglobulins, including IgM(κ), IgG(κ), and IgG(λ). Unusual components were also found. For example, α_1-fetoprotein was present in 4 cryoprecipitates: in 2 of these, as the single constituent and in 2 others, associated with immunoglobulins. In another example, hepatitis-associated antigen coexisted with IgM, IgG, and α_1-fetoprotein. Autoantibody activities in the different cryoglobulins were found against human γ-globulin, nuclear, smooth muscle, and mitochondrial antigens. In one case, the IgM(κ) of the cryoprecipitate had antibody activity against α_1-fetoprotein, and α_1-fetoprotein was also present in the cryoprecipitate, suggesting immuno-complex formation. Autoantibodies were also studied in the patients' sera, and, depending on the patient, were found against γ-globulin, nuclei, DNA, single stranded DNA, saline-soluble calf thymus extract, smooth muscle, non-organ-specific cytoplasm, gastric parietal cell cytoplasm, mitochondria, and α_1-fetoprotein.

4716 UNUSUAL PATTERN OF HEPATIC ALKALINE PHOSPHATASE ACTIVITY AND RENAL CARCONOMA.

(E.) Axelsson, U.; Hagerstrand, I.; Zettervall, O. (Dept. Internal Med., Univ. Lund, Sweden). *Acta Med. Scand.* 195(3):223-225, 1974.

Two patients, a 35-yr-old woman and a 54-yr-old man, had renal carcinomas associated with hepatic dysfunction in the absence of hepatic metastases. Moderately elevated serum alkaline phosphatase activity was found. Liver biopsy specimens disclosed the morphology was normal, but the abnormal localization of alkaline phosphatase activity was found adjacent to the canaliculi in the entire hepatic lobules. One patient had strong acid phosphatase activity in the hepatocyte lysosomes, while β-glucuronidase activity was weak. These finding were reversed in the other patient. Serum alkaline phosphatase and platelet levels normalized after extirpation of the tumor. It is concluded that the canalicular phosphatase activity is in some way induced by a humoral tumor agent. The agent produced by the tumor cells might enter hepatocytes through endocytosis and be at least partly digested by acid hydrolases, and metabolites might be secreted into the bile demanding canalicular alkaline phosphatase activity. It should be realized that liver function disorders may be a paraneoplastic manifestation and are not necessarily symptoms of liver metastasis.

4717 CONGENITAL HEPATIC FIBROSIS. TWO CASES SIMULATING HEPATIC CIRRHOSIS.

(E.) Campana, H. A.; Park, Y. S.; Gourgoutis, G. D. (VA Ctr., Dayton, Ohio). *Am. J. Dig. Dis.* 19(4): 325-333, 1974.

Congenital hepatic fibrosis was detected in a 10 yr-old-boy with hepatosplenomegaly and leukopenia and in a 45-yr-old male with hepatomegaly. Bleeding attributable to esophageal varices occurred several years after the original findings in both patients. This was treated by elective portasystemic shunts. Several factors were used in differentiating the congenital hepatic fibrosis from cirrhosis of the liver. In both patients, the preshunt liver function tests were essentially normal, but essentially normal or borderline liver function tests have been reported for latent or posthepatic cirrhosis as well. Liver scans showed homogeneous uptake of ^{198}Au in these patients, suggestive of congenital hepatic fibrosis. Gross morphology of the livers at laparotomy was indistinguishable from that of cirrhosis. Liver wedge biopsies revealed portal and interlobular fibrosis and biliary duct hyperplasia, simulating cirrhosis, but in neither case was there evidence of sequelae of liver-cell necrosis such as pseudolobulation, replacement fibrosis, or hepatocyte regeneration which would have been present in cirrhosis. Other biopsy findings useful in the differentiation included mature bile duct proliferation, absence of significant intraportal or interlobular inflammatory infiltrate, and small or hypoplastic distal portal vein branches. No progression of the disease was noted on liver biopsy repeated 8 yr later, a significant difference from the expected findings in cirrhosis cases. Hepatic vein catheterization and portal venography in the adult patient indicated intrahepatic presinusoidal block, while in cirrhosis of the liver, para- or post-sinusoidal blocks are more typical. Neither patient had jaundice, ascites, or polycystic kidneys. Each case appeared sporadic.

4718 MORPHOLOGIC STUDIES ON SECONDARY PHOSPHOLIPIDOSIS IN HUMAN LIVER.

(E.) De La Iglesia, F. A.; Feuer, G.; Takada, A.; Matsuda, Y. (Warner Lambert Res. Inst., Toronto, Canada). *Lab. Invest.* 30:4):539-549, 1974.

Liver biopsy specimens were studied from 5 Japanese patients (4 females and 1 male, aged 42-60 yr) who showed protracted hepatic involvement and characteristic clinical manifestations of slight fever, anorexia, general malaise, and upper respiratory tract involvement. Light microscopic investigations of paraffin-embedded liver tissue materials revealed a foamy cytoplasmic appearance of hepatocytes and moderate bile duct proliferation with accumulation of inflammatory cells in the portal spaces. Dense dark bodies were found in semithick sections as revealed by differential interference contrast microscopy. All cell types seen in the liver parenchyma reflected this change. Ultrastructural features consisted of dark bodies, intracytoplasmic inclusions, and altered mitochondria in the hepatocytes. The dense bodies represented secondary lysosomes, with typical onion-like configuration of material resembling myelin. The development of these liver changes has been attributed to the long term (at least 6 months) administration of 4, 4'-bis-(β-diethylaminoethoxy)-α,β-diethyldiphenylethane, (Coralgil), a coronary vasodilating agent. These results, coupled with animal studies, suggest that the drug was probably responsible for the impairment of the hepatic phospholipid synthesis. The effects can be considered either a secondary lysosomal response with subsequent alteration of the rate of phospholipid disposition, or a direct interference with phospholipid metabolism leading to either aberrant binding or formation of foreign phospholipids which cannot be eliminated through normal pathways.

4719 LONG-TERM CHELATION THERAPY IN THALASSAEMIA MAJOR: EFFECT ON LIVER IRON CONCENTRATION, LIVER HISTOLOGY, AND CLINICAL PROGRESS.

(E.) Barry, M.; Flynn, D. M.; Letsky, E. A.; Risdon, R. A. (Royal Free Hosp., London, England). *Br. Med. J.* 2(5909):16-20, 1974.

A trial of continuous chelation therapy was conducted on 9 children with homozygous thalassemia for a period of time ranging from 5.2 to 6.3 yr. Nine other thalassemic children, used as controls, were not treated with chelators. All 18 patients were transfused every 4-8 weeks to keep the hemoglobin concentration between 8.0 and 15.0 g/100ml. The chelator-treated patients received desferrioxamine mesylate (0.5 g in 2 ml water, i.m., 6 days/week) and diethylenetriamine penta-acetate (2 g, i.v. with each unit of blood). The latter drug was changed to desferrioxamine in 4 cases. The difference in mean liver iron concentration between the treated and untreated groups at the start of the study was not significant. In both groups the liver iron concentration increased with the amount of blood transfused, but the rise was much greater in the controls. Similarly, fibrosis levels at the start of the trial were not significantly different between the groups, but, by the end of the trial, there was progressive fibrosis in the controls and no significant change in the chelator-treated group. No major clinical differences were noted between the 2 groups, perhaps because both groups included several older children who were heavily loaded with iron at the start of the trial. Among the younger patients, however, puberty was delayed in 4 of 5 controls but in only 1 of 4 chelator-treated children. Prepubertal growth rate was significantly greater in the chelator-treated patients than in the controls.

4720 PRIMARY LEIOMYOSARCOMA OF THE LIVER.

(E.) Fong, J. A.; Ruebner, B. H. (Univ. California Sch. Med., Davis). *Hum. Pathol.* 5(1):115-119, 1974.

Leiomyosarcoma was diagnosed from a liver biopsy taken from a 62-yr-old man who presented with abdominal swelling of 1 month's duration and a history of abdominal pain and a weight loss of 20 pounds dating back 1 yr. Liver scanning with ^{198}Au revealed that about 60% of the liver had been replaced by nodules of nonfunctioning tissue. Although no specific therapy was administered, the patient survived for 20 months after the diagnosis had been established. At autopsy, 95% of the liver had been replaced by coalescing tumor nodules ranging in size from 2-15 cm. Other findings included approximately 5000 ml of ascitic fluid and metastases in the lungs, pancreas, peritoneum, thyroid, adrenals, and kidneys. No evidence of cirrhosis was found. This is the 8th reported case of a primary hepatic leiomyosarcoma. Since these tumors appear to follow a relatively indolent course, it is recommended that they be treated by hepatic dearterialization and infusion of 5-fluorouracil *via* the portal vein, followed by resection, if possible.

4721 ACUTE FATTY LIVER OF PREGNANCY WITH DISSEMINATED INTRAVASCULAR COAGULATION.

(E.) Holzbach, R. T. (St. Luke's Hosp., Cleveland, Ohio). *Obstet. Gynecol.* 43(5): 740-744, 1974.

A 29-yr-old female presented with epigastric pain, nausea, and vomiting following ingestion of furosemide (40 mg/day) prescribed for ankle edema and a sudden 7-lb weight gain during the 35th week of pregnancy. These symptoms, plus cephalopelvic disproportion necessitated successful termination of the pregnancy by elective cesarean section after which the patient became almost oliguric. On the 2nd postoperative day gastrointestinal bleeding was noted and was followed by fever, hyperbilirubinemia, and increased serum alkaline phosphatase and SGOT values. Her symptoms paralleled those for acute fatty liver of pregnancy. A liver biopsy obtained during the resolving phase of the illness showed distension of the cytoplasm by many small vacuoles, but nuclei were normal both in appearance and in their position within the cell. These findings contrast with those observed in fatty liver associated with nutritional deficiencies or excessive alcohol intake. Laboratory evidence suggestive of an associated disseminated intravascular coagulation process included red cell morphology showing typical microangiopathic changes, a marked reduction of measured coagulation precursor substrates as well as RBC and platelets, and the identification of fibrinogen-split products in the presence of very low levels of circulating fibrinogen. It is suggested that disseminated intravascular coagulation may be important in the widespread organ abnormalities found in acute fatty liver of pregnancy. Early information as to its presence should be sought in these cases so that the intensive therapeutic regimen, including replacement therapy with fresh-frozen plasma and intermittent i.v. heparin in controlled dosages, might be started.

4722 RECURRENT JAUNDICE IN PREGNANCY. IV. QUANTITATIVE DETERMINATION OF URINARY AND BILIARY ESTROGENS, INCLUDING STUDIES IN PRURITUS GRAVIDARUM.

(E.) Adlercreutz, H.; Tikkanen, M. J.; Wichmann, K.; Svanborg, A.; Anberg, A. (Dept. Clin. Chem., Univ. Helsinki, Finland). *J. Clin. Endocrinol. Metab.* 38(1):51-57, 1974.

Estrogen metabolism in recurrent jaundice of pregnancy and pruritus gravidarum was studied by determining 12 different estrogens in bile and urine. A uniformly marked fall in the biliary concentrations of all estrogens was observed in pregnancy jaundice. This would suggest that the enterohepatic circulation of these steroids is impaired and offers an explanation for the abnormal pattern of urinary estrogens observed in the two related syndromes. The relative excretion (= percentage of total estrogens) of estriol and 16-epiestriol in urine was diminished, whereas that of their espective precursors, 16α-hydroxyestrone and 16β-hydroxyestrone was increased. Rather small or insignificant changes were seen in the urinary excretion of other estrogens. Hence the main alterations occurred in the 16-hydroxylation pathways and included decreased conversion of 16α-hydroxyestrone to estriol and of 16β-hydroxyestrone to 16-epiestriol. The primary cause of these alterations is most likely the decreased biliary excretion of estrogens with consequent impairment of their enterohepatic circulation. This is in accordance with the view that recurrent jaundice of pregnancy and pruritus gravidarum are not caused by a primary abnormality in estrogen production or metabolism in the fetoplacental unit.

4723 STUDIES OF LIPIDS AND LIPOPROTEINS IN LIVER DISEASE. *(Ger.)* Vogt, N.; Greiner, M.; Wienbeck, M.; Dolle, W.; Englhardt, A. (Med. Clin., Univ. Marburg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1330-1332, 1972.

Serum lipids and lipoproteins were separated by gel electrophoresis, stained with Schiff's reagent, and determined densitometrically on 30 patients with serum hepatitis, 27 with acute viral hepatitis, and a group of patients with chronic persistent and chronic aggressive hepatitis, cirrhosis, and acute and subacute hepatic dystrophy. Total lipids and β-lipoproteins increased while α-lipoproteins and pre-β-lipoproteins decreased in acute hepatitis. When symptoms were most severe, the pre-β- and β-lipoprotein fractions could not be separated in many cases. In one patient who developed acute hepatitis after receiving several blood transfusions, lipoprotein values were correlated with both triglyceride and transaminase values since the increase in triglycerides was associated with an increase in β-lipoproteins. A second episode of hepatitis, which occurred 25 days after onset of symptoms, was associated with a second increase in transaminase values, a decrease in α-lipoproteins, and a loss of the pre-β-lipoprotein fraction. A second patient with alcoholic hepatitis had a lipoprotein pattern characteristic of acute hepatitis but only slightly increased transaminase values. Simultaneous changes occurred in triglyceride and lipoprotein values. In a patient with diabetes mellitus who required insulin, the type IV pattern associated with diabetes disappeared during the acute stage and appeared again toward the end of the disease. No significant changes occurred in the triglyceride levels in patients with compensated and decompensated cirrhosis but, depending upon the severity of the disease, the lipoprotein pattern was similar to that found in acute hepatitis. Statistically significant decreases occurred in the α- and pre-β-lipoprotein fractions in chronic aggressive hepatitis, decompensated cirrhosis, and hepatic coma. Since cholestasis was detected in only a few cases, it can be ruled out as the cause of changes in the lipoprotein pattern of these patients.

4724 EFFECT ON THE DIURESIS OF SIMULTANEOUSLY APPLIED INFUSIONS OF HYPOTONIC LIQUID INTO THE PORTAL VEIN AND OF HYPERTONIC LIQUID INTO THE SUPERIOR VENA CAVA. AN ATTEMPT AT DEMONSTRATING THE EXISTENCE OF AN INTRAPORTAL OSMOREGULATORY SYSTEM IN MAN. *(E.)* Lindahl, F.; Lund, B.; Boas, B.; Schmidt, A. (Frederiksberg Hosp., Hellerup, Denmark). *Scand. J. Gastroenterol.* 9(2):133-136, 1974.

In order to demonstrate the existence of an intraportal osmoregulatory system in man, catheters were introduced prior to surgery, via the umbilical vein into the portal vein in 15 patients, aged 42-73 years. Of the 15 patients, 10 suffered from cholelithiasis, 2 from duodenal ulcer, and 2 from nonmetastasizing cancer of the colon. There was 1 on whom explorative coeliotomy revealed no pathological process. Renal and liver functions in all were normal. After surgery, 100 ml of a hypotonic solution was infused via the catheter and, in order to obtain isomolarity in the right atrium after mixing, the same volume of hypertonic sodium chloride was infused via the catheter in the superior vena cava. A 1.2% change in the osmolarity in the left portal vein did not bring about any significant changes in the diuresis within six 15-min periods. Each patient served as his own control and changes in the diuresis were considered relevant indicators of the effect. Therefore it was concluded that the possible existence of an intraportal osmoregulatory system could not be considered to be of any physiological significance.

4725 REYE'S SYNDROME AND HYPERAMINOACIDEMIA. *(E.)* Hilty, M. D.; Romshe, C. A.; Delamater, P. V. (Med. Coll. Georgia, Augusta). *J. Pediatr.* 84(3):362-365, 1974.

The serum amino acids have been quantitated in 16 children with Reye's syndrome, 2 children with hepatitis and hepatic coma and 5 children with salicylism. The 5 children with salicylism had had viral illnesses and had been treated with acetylsalicylic acid (117 to 295 mg/kg/day for 24 to 144 hr) and at admission they were acidotic, semicomatose, hyperpneic, and had serum salicylate concentrations from 38-80 mg/100 ml. Liver functions in the children with hepatitis and hepatic coma were abnormal and remained so for at least 2 months. Hyperaminoacidemia was present in all Reye's syndrome patients with the most consistent and largest increases occurring with glutamine, alanine, α-amino-N-butyrate, and lysine. Significant differences in the concentrations of glycine, alanine, valine, leucine, ornithine, and lysine were noted between patients who survived and those who did not survive. Serum amino acid concentrations were normal in all children with salicylism and in 1 child with hepatitis and hepatic coma. In the other child with hepatitis, glutamic acid, alanine, methionine, and ornithine were only moderately elevated. In Reye's syndrome patients, SGOT values ranged from 64 to 1,420 U/ml and SGPT from 125 to 2,240 U/ml. In the salicylism patients, increased blood ammonia and serum transaminase were noted unexpectedly, and thought to result from excessive acetylsalicylic acid ingestion. These results indicate that the amino acid pattern of Reye's syndrome reflects a deficiency of ornithine transcarbamylase which may be secondary to injury of hepatic mitochondria. It is felt that serum amino acid analysis may help distinguish Reye's syndrome from hepatitis with hepatic coma and from severe salicylism.

4726 NONMETASTATIC HEPATOMEGALY AND LIVER MALFUNCTION ASSOCIATED WITH RENAL CANCER. *(Fr.)* Gadrat, J. (no affil.). *Bull. Acad. Natl. Med.* 156(16/17):499-510, 1972.

Case reports are presented for 2 women with primary nephroepitheliomas who also had hepatomegaly and evidence of abnormal liver function although no evidence of hepatic metastases was found. A 48-yr-old woman presented with hepatomegaly, fever, and eosinophilia of unknown origin. Total bilirubin, serum alkaline phosphatase activities, and the BSP retention time were increased, but liver scans showed no evidence of a tumor and a liver biopsy revealed localized nonspecific granulomatosis in the portal spaces and entire parenchyma. An i.v. pyelogram was normal and tests for collagen diseases and parasites were negative. The patient was discharged without a diagnosis after her fever had been controlled with indomethacin. She was hospitalized again 4 months later with splenomegaly, enlargement of the right submaxillary gland, and persistent eosinophilia. Microvesicular steatosis was found in the liver, and pathological examination of the right submaxillary gland revealed a massive metastasis from an epithelioma which was probably renal in origin. Evidence of a renal tumor was detected on a second i.v. pyelogram along with an increase in the size of a lymph node situated on the level of the 2nd lumbar vertebra, suggesting the presence of another metastasis. The patient died a few weeks later, but no autopsy was performed. A 28-yr-old woman presented with abdominal pain which responded to antispasmodics, hepatomegaly, anemia, and an increased erythrocyte sedimentation rate. Three months later a mass was palpated below the liver and radiological examinations revealed compression of the duodenum and gallbladder. Other findings included hypergammaglobulinemia with a significant increase in γ_M-globulin typical of cirrhosis and increases in serum alkaline phosphatase and BSP retention times. Evidence for a renal tumor was obtained from uretomography and arteriography of the celiac trunk, superior mesenteric, and right renal arteries. At surgery a clear-cell epithelioma was removed *en bloc* with the right kidney, and no metastases were found in the liver. The liver returned to its normal size a few weeks later, and alkaline phosphatase activities and BSP retention times gradually normalized.

4727 BILIARY MAGNESIUM LOSS IN THE POSTOPERATIVE PATIENT. *(E.)* Smith, G. A.; Tompkins, R. K. (Univ. California Los Angeles, Med. Sch.). *Arch. Surg.* 109(1):77-83, 1974.

4728 ESOPHAGEAL VARICES IN A 60-YEAR-OLD MAN WITH GAUCHERS DISEASE. *(E.)* Kozower, M.; Kaplan, M. M.; Kanfer, J. N.; Norton, R. A.; Wolfe, H. J. (New England Med. Ctr., Boston, Mass.). *Am. J. Dig. Dis.* 19(6):565-570, 1974.

4729 CYSTIC DISEASE OF THE LIVER. *(E.)* Sanfelippo, P. M.; Beahrs, O. H.; Weiland, L. H. (Mayo Clin., Rochester, Minn.). *Ann. Surg.* 179(6): 922-925, 1974.

4730 AMOEBIC LIVER ABSCESS: SYNDROMES OF 'PRE-RUPTURE' AND INTRAPERITONEAL RUPTURE. *(E.)* Ramachandran, S.; Goonatillake, H. D. (Colombo North Gen. Hosp., Ragama, Sri Lanka). *Br. J. Surg.* 61(5): 353-355, 1974.

4731 LIVER DRUG METABOLISM IN TUMOR-BEARING SURGICAL PATIENTS. *(E.)* Pelkonen, O.; Karki, N. T.; Larmi, T. K. I. (Dept. Pharmacol., Univ. Oulu, Finland). *Chir. Gastroenterol.* 7(4):436-443, 1973.

4732 A CASE OF HYDATID CYST OF THE LIVER WITH DOUBLE GASTRIC AND BILIARY PERFORATION. *(E.)* Massaioli, N.; Nano, M.; Fausone, G. (Inst. Special Surg., Univ. Torino, Italy). *Chir. Gastroenterol.* 7(4):483-492, 1973.

4733 ENOTOXAEMIA IN FULMINANT HEPATIC FAILURE. *(E.)* Wilkinson, S. P.; Arroyo, V.; Moodie, H.; Williams, R. (King's Coll. Hosp., Med. Sch., London, England). *Clin. Sci. Mol. Med.* 46(6):30p-31p, 1974.

4734 THE LIVER IN ALPHA$_1$-ANTITRYPSIN DEFICIENCY. *(E.)* Feldmann, G.; Bignon, J.; Chahinian, P. (Beaujon Hosp., Clichy, France). *Digestion* 10: 162-174, 1974.

4735 A CIRCULATING ACTIVATOR OF GRANULOCYTES IN LIVER DISEASE. *(E.)* Territo, M. C.; Davidson, W. D.; Tanaka, K. R. (Harbor Gen. Hosp., Torrance, Calif.). *Experientia* 30(3):302-303, 1974.

4736 PRIMARY LYMPHOSARCOMA OF THE LIVER RESULTING IN FULMINANT HEPATIC FAILURE. *(E.)* Mandelstam, P.; Canlas, M. (Univ. Kentucky Coll. Med., Lexington). *Gastroenterology* 66(4):739, 1974.

4737 FURTHER EPIDEMIOLOGIC STUDIES IN PATIENTS WITH HEPATOMA IN SOUTH VIETNAM. *(E.)* Welsh, J. D.; Brown, J. D.; Arnold, K.; Prince, A. (Univ. Oklahoma Health Sci. Ctr., Oklahoma City). *Gastroenterology* 66(4):797, 1974.

4738 THE ETIOLOGY OF BUDD-CHIARI SYNDROME IN 21 PATIENTS. *(E.)* Brown, B. D.; Hensley, G. T.; Whalen, G. E.; Varma, R. R. (Wood VA Hosp., Milwaukee, Wis.). *Gastroenterology* 66(4):834, 1974.

4739 CHOLESTATIC SYNDROME IN CHILDHOOD: QUANTITATIVE ESTIMATION OF BILE ACID EXCRETION IN URINE AND FECES. *(E.)* Lavy, U.; Javitt, N. B. (New York Hosp., Cornell Med. Ctr., N.Y.). *Gastroenterology* 66(4):849, 1974.

4740 THE LIVER DISEASE ASSOCIATED WITH ALPHA$_1$-ANTITRYPSIN DEFICIENCY IN CHILDREN. *(E.)* Moroz, S. P.; Cutz, E.; Cox, D.; Sass-Kortsak, A. (Dept. Pediatr., Univ. Toronto, Canada). *Gastroenterology* 66(4):857, 1974.

4741 SELECTIVE IgA DEFICIENCY ASSOCIATED WITH HEPATOMA. *(E.)* Dourdourekas, D.; Ainis, H.; Shobassy, N.; Szanto, P.; Steigmann, F. (Cook County Hosp., Chicago, Ill.). *Gastroenterology* 66(4):882, 1974.

4742 PRIMARY LIVER CARCINOMA: RELATIONSHIP TO ALCOHOL AND HBAg. *(E.)* Dourdourekas, D.;

Darani, M.; Ainis, H.; Szanto, P.; Steigmann, F. (Cook County Hosp., Chicago, Ill.). *Gastroenterology* 66(4):882, 1974.

4743 TREATMENT OF THE HIGH CARDIAC OUTPUT TYPE II HEPATORENAL SYNDROME WITH L-DOPA AND α-ADRENERGIC AGENTS. *(E.)* Falcao, H.; Fischer, J. E. (Harvard Med. Sch., Boston, Mass.). *Gastroenterology* 66 (4):883, 1974.

4744 PATHOLOGY OF HUMAN HEPATIC GRAFT-VERSUS-HOST DISEASE (H-GVHD). *(E.)* Lerner, K. G.; Smuckler, E. A.; Kao, G. F. (Univ. Washington, Seattle). *Gastroenterology* 66(4):890, 1974.

4745 ABNORMAL RED CELL METABOLISM AND HEINZ BODY FORMATION IN PATIENTS WITH LIVER DISEASE. *(E.)* Smith, J. R.; Kay, N. E.; Gottlieb, A. J.; Oski, F. A. (State Univ. New York, Upstate Med. Ctr., Syracuse). *Gastroenterology* 66(4):894, 1974.

4746 IMPLICATIONS OF PORTAL HEPATOTROPHIC FACTORS IN HEPATOLOGY. *(E.)* Popper, H. (Mt. Sinai Sch. Med., New York, N.Y.). *Gastroenterology* 66(6): 1227-1233, 1974.

4747 THE "HOT" HEPATIC ABSCESS. *(E.)* Chayes, Z.; Koenigsberg, M.; Freeman, L. M. (Albert Einstein Coll. Med., Bronx, N.Y.). *J. Nucl. Med.* 15 (4):305-307, 1974.

4748 STUDIES IN TYPE I GLYCOGENOSIS OF THE LIVER. THE GENESIS AND DISPOSITION OF LACTATE. *(E.)* Sadeghi-Nejad, A.; Presente, E.; Binkiewicz, A.; Senior, B. (Tufts-New England Med. Ctr. Hosp., Boston, Mass.). *J. Pediatr.* 85(1):49-54, 1974.

4749 LIVER TRAUMA IN THE NEW BORN: A CASE REPORT. *(E.)* Goodman, J. M. (Eden Hosp., Castro Valley, Calif.). *J. Trauma* 14(5):427-428, 1974.

4750 BIS-(MONOACYLGLYCERYL) PHOSPHATE AND ACYL PHOSPHATIDYLGLYCEROL ISOLATED FROM HUMAN LIVERS OF LIPIDOSIS INDUCED BY 4,4'-DIETHYLAMINOETHOXYHEXESTEROL. *(E.)* Kasama, K.; Yoshida, K.; Takeda, S.; Akeda, S.; Kawai, K. (Mie Univ. Sch. Med., Tsu, Japan). *Lipids* 9(4):235-243, 1974.

4751 INTRAHEPATIC LITHIASIS. *(Sp.)* Estrada, L.; Miyar, A.; Valverde, D. (Nuestra Senora de Covadonga Munic. Sanit., Oviedo, Spain). *Rev. Esp. Enferm. Apar. Dig.* 42(2):173-178, 1974.

4752 TREATMENT OF HEPATIC COMA BY EXTRACORPOREAL PERFUSION OF ISOLATED PIG LIVER: ANALYSIS OF FIVE CLINICAL CASES. *(Sp.)* Camprodon, R.; Salva, A.; Jornet, J.; Guerrero, J. A.; Mendoza, C. G.; Segura, J.; Pineiro, H.; Canela, M.; Tarragona, L.; Monteis, J.; Soley, P.; Solsona, J.; Pedros, J. (Francisco Franco Munic. Sanit., Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 42(2):131-148, 1974.

4753 PRIMARY MALIGNANT TUMORS OF THE LIVER AND PARANEOPLASTIC SYNDROMES. *(Sp.)* Hita Perez, J.; Cosme Jimenez, A.; Perez Carnero, A.; Muro, J.; Vazquez Rodriguez, J.; Olmo Fabra, A. (La Paz Munic. Sanit., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 42(4):415-424, 1974.

4754 URIDINE-5-DIPHOSPHOGLUCOSE IN THE TREATMENT OF LIVER DISEASES OF DIFFERENT ETIOLOGIES. *(Sp.)* de las Casas Alonso, P.; Carballo Garcia, L.; Silverio Garcia, C. (Nuestra Senora de la Candelaria Resident Sanit., Santa Cruz de Tenerife, Canary Islands). *Rev. Esp. Enferm. Apar. Dig.* 42(5):561-574, 1974.

4755 EXPERIENCE WITH INFUSION AND RESECTION IN CANCER OF THE LIVER. *(E.)* Stehlin, Jr., J. S.; Hafstrom, L.; Greeff, P. J. (St. Joseph Hosp., Houston, Tex.). *Surg. Gynecol. Obstet.* 138(6):855-863, 1974.

4756 NONPARASITIC CYSTS OF THE LIVER. *(E.)* Coutsoftides, T.; Hermann, R. E. (Cleveland Clin. Fdn., Ohio). *Surg. Gynecol. Obstet.* 138 (6):906-910, 1974.

4757 ANGIOMATOUS HEPATOMA - AN UNUSUAL PRESENTATION. *(E.)* Jaiswal, M. S. D.; Singh, R. V.; Mahendra, N. N.; Rai, S. P. (K. G. Med. Coll., Lucknow, India). *Surg. J. New Delhi* 8(3/4/5):17-20, 1973.

4758 HEPATIC CHOLANGIOHAMARTOMAS (VON MEYENBURG'S COMPLEXES). *(It.)* Pollice, L.; Colonna, M. (Inst. Pathol. Anat. Histol., Univ. Bari, Italy). *Tumori* 59(6):437-447, 1973.

See also 4271, 4273, 4366, 4378, 4379, 4380, 4393, 4398, 4410, 4413, 4414, 4415, 4416, 4419, 4421, 4422, 4425, 4429, 4431, 4438, 4450, 4463, 4567, 4583, 4642, 4682, 4817, 4833, 4946.

Hyperbilirubinemic States

4759 TETRACYCLINE HEPATOTOXICITY IN THE DIFFERENTIAL DIAGNOSIS OF POSTOPERATIVE JAUNDICE.

(E.) Lloyd-Still, J. D.; Grand, R. J.; Vawter, G. F. (Harvard Med. Sch., Boston, Mass.). *J. Pediatr.* 84(3):366-370, 1974.

Hepatotoxicity due to tetracycline occurred in 3 females (aged 2-10 yr) with obstructive uropathies. Differential diagnosis in these children included fulminant viral hepatitis or halothane toxicity with hepatic necrosis, severe bacterial or viral septicemia, Reye's syndrome, and other causes of postoperative jaundice. The clinical and histological features strongly favored tetracycline hepatotoxicity in that all 3 developed nausea, vomiting, jaundice, progressive lethargy, coma and fine fatty infiltration of the liver a few days after the i.v. administration of the drug. No histological features of halothane toxicity or viral hepatitis was present. Some impairment of renal function was present in all patients. Autopsy findings on the 2 who died showed fatty infiltration of the liver and disseminated candidiasis. Recovery occurred in 1 patient after the use of tetracycline was discontinued; liver biopsy confirmed the presence of fatty infiltration. In 2 cases the history showed episodes of hypotension that could have caused the extensive renal tubular damage but there was also evidence of cytoplasmic vacuolization in all tubules. The etiology of the hyperglycemia in 2 cases was not known. These findings demonstrate the dangers of administering tetracycline i.v. to children with impaired renal function, and differentiate tetracycline-induced hepatic injury from that due to halothane.

4760 EFFECT OF PHENOBARBITONE ON PLASMA [14C]BILIRUBIN CLEARANCE IN PATEINTS WITH UNCONJUGATED HYPERBILIRUBINEMIA.

(E.) Black, M.; Fevery, J.; Parker, D.; Jacobson, J.; Billing, B. H.; Carson, E. R. (Royal Free Hosp., London, England). *Clin. Sci. Mol. Med.* 46(1): 1-17, 1974.

The clearance of a tracer dose of [^{14}C]bilirubin from the plasma was studied in 12 patients with Gilbert's syndrome (2 females and 10 males, aged 16-57 yr), 4 patients with congenital non-hemolytic jaundice (1 female and 3 males, aged 8-14 yr), 1 patient with hemolytic jaundice (male, aged 23 yr), and 4 normal subjects (all males, aged 29-32 yr). Clearance was significantly impaired in patients with Gilbert's syndrome and in those with congenital non-hemolytic jaundice when compared with normal controls, but was normal in the patient with hemolytic jaundice. Treatment with phenobarbital (180 mg/day for 2 weeks) lowered the plasma bilirubin concentration and improved all indices of plasma clearance of the isotope in patients with Gilbert's syndrome, so that their values became indistinguishable from those of the controls. The improvement in plasma [^{14}C]bilirubin clearance in these patients was associated with modest increases in hepatic bilirubin glucuronyl transferase in some subjects. Phenobarbital treatment improved plasma bilirubin concentrations and plasma [^{14}C]bilirubin clearance in patients with congenital non-hemolytic jaundice, so that they resembled those seen in patients with untreated Gilbert's syndrome. Despite this improvement, hepatic bilirubin glucuronyl transferase activity remained undetectable. These results compare well with the hypothesis that Gilbert's syndrome is a manifestation of a relative deficiency of hepatic bilirubin glucuronyl transferase, and differs from congenital non-hemolytic jaundice only in severity.

4761 INCREASED GLUCURONIDATION OF BILIRUBIN IN MAN AND RAT BY ADMINISTRATION OF ANTIPYRINE (PHENAZONE).

(E.) Orme, M. L'E.: Davies, L.; Breckenridge, A. (Royal Postgrad. Med. Sch., London, England). *Clin. Sci. Mol. Med.* 46(4):511-518, 1974.

Antipyrine (600 mg/day for 6 weeks) was administered to 6 male patients (aged 17-35 yr) with Gilbert's syndrome. This treatment caused a significant fall in both total and unconjugated serum bilirubin concentrations with none of the side effects associated with phenobarbital therapy. The maximum reduction in serum bilirubin concentration was achieved by 2 weeks and, after this time, the level remained relatively constant. When male Wistar rats were given twice daily i.p. injections of antipyrine (80 or 240 mg/kg) for 3-1/2 days, a significant increase was observed in the apparent maximal velocity for the glucuronidation of bilirubin by liver microsomal preparations, as determined by varying the concentration of either uridine diphosphate glucuronic acid or bilirubin in the tests. There was no significant difference between the apparent maximal velocity values attained with the 2 different doses of antipyrine. Neither the microsomal protein content nor the apparent affinity constant was altered in these studies with antipyrine. Comparable administration of phenobarbital (80 mg/kg) caused significant increase in the microsomal protein content, but no significant change in the values for the apparent maximal velocity or apparent affinity constant for the glucuronidation of bilirubin with varying concentrations of uridine diphosphate glucuronic acid and bilirubin. Applied to the situation in humans, these results suggest that the fall in serum unconjugated bilirubin after treatment with phenobarbital may not be due to increased activity of bilirubin-glucuronosyltransferase. Phenobarbital may cause an increase in liver blood flow, bile flow, or organic anion hepatic binding protein, all perhaps contributing to serum bilirubin changes. Antipyrine may act by causing a specific increase in enzyme activity, and in patients with low bilirubin-glucuronosyltransferase activity it would be more acceptable for therapy than phenobarbital.

4762 HEPATIC BILIRUBIN GLUCURONIDATION IN NEONATES WITH UNCONJUGATED HYPERBILI-

RUBINEMIA AND CONGENITAL GASTROINTESTINAL OBSTRUCTION. *(E.)* Felsher, B. F.; Carpio, N. M.; Woolley, M. M.; Asch, M. J. (Univ. Southern California Sch. Med., Los Angeles). *J. Lab. Clin. Med.* 83(1):90-96, 1974.

Hepatic bilirubin uridine diphosphate glucuronyl transferase activity was assayed in surgical liver biopsies from 10 icteric and 7 anicteric neonates who underwent laparotomy for congenital gastrointestinal obstruction, and from 6 neonates with obstructive jaundice unassociated with gastrointestinal obstruction. In the icteric group (5 males and 5 females, aged 2 to 41 days at surgery), the serum bilirubin was predominantly unconjugated and its concentration ranged from 2.4 to 15.9 mg/100 ml, while the uridine diphosphate glucuronyl transferase activity ranged from 0 to 180 μg of bilirubin conjugated/hr/g liver. Pyloric stenosis was present in 6 patients, malrotation in 2, and duodenal atresia with malrotation in 2. The anicteric group (5 males and 2 females, aged 19-71 days), all with pyloric stenosis, had serum bilirubin concentrations of only 0.5 to 1.7 mg/100 ml, while their uridine diphosphate glucuronyl transferase activities showed a range of 520 to 800 μg bilirubin conjugated/hr/g liver, which was within or slightly below the previously determined normal range in adults. The enzymic activity for the 6 neonates (aged 14 to 85 days) with obstructive jaundice unassociated with gastrointestinal obstruction was normal (780 to 1840 μg bilirubin conjugated/hr/g liver). The results thus showed that hepatic bilirubin uridine diphosphate glucuronyl transferase activity in neonates with unconjugated hyperbilirubinemia and gastrointestinal obstruction is markedly and uniformly decreased compared with anicteric neonates with pyloric obstruction and neonates with obstructive jaundice. The unconjugated hyperbilirubinemia associated with congenital gastrointestinal obstruction likely results from caloric deprivation superimposed on an underlying deficiency of hepatic uridine diphosphate glucuronyl transferase activity.

4763 UNCONJUGATED HYPERBILIRUBINEMIA IN ACHALASIA. *(E.)* Fevery, J.; Heirwegh, K. P. M.; De Groote, J. (St. Rafael Univ. Hosp., Louvain, Belgium). *Gut* 15(2): 121-124, 1974.

Moderate unconjugated hyperbilirubinemia was observed in 2 patients (1 male and 1 female, aged 44 and 22 yr, resp.) with achalasia. Liver biopsy showed that the hepatic digitonin-activated bilirubin uridine diphosphate glucuronyl transferase activity was decreased in both patients and they were considered, therefore, to have Gilbert's syndrome. The achalasia seemed only to have functioned by inducing caloric restriction, thus causing the hyperbilirubinemia known to be associated with fasting. The hyperbilirubinemia decreased after pneumatic dilatation of the gastroesophageal sphincter to permit a normal amount of food intake. This situation is comparable to the jaundice found in neonates with pyloric stenosis or other types of obstruction of the upper gastrointestinal tract. The mechanism for fasting-induced type hyperbilirubinemia appears complex.

4764 EFFECT OF SOME ANTIINFLAMMATORY AGENTS ON EXPERIMENTAL HYPERBILIRUBINEMIA. *(Rus.)* Pidemskii, E. L.; Vakhrusheva, L. G.; Mardanova, L. G. (Natl. Sci. Inst., Perm Univ., USSR). *Patol. Fiziol. Eksp. Ter.* (3):39-42, 1973.

The effects of antiinflammatory agents was studied on hyperbilirubinemia induced in Wistar rats by administration of carbon tetrachloride (0.4 mg/kg p.o. for 3 successive days) or by ligation of the bile ducts. Starting on the 2nd day carbon tetrachloride was given, rats received prednisolone (1 mg/kg), nifenazone (10 mg/kg), phenylbutazone (30 mg/kg), or anthradione (50 mg/kg) daily p.o. in 2% starch suspension. All of these agents prevented the development of hyperbilirubinemia in carbon tetrachloride-treated rats. Blood bilirubin levels were even lower in treated rats than in intact controls. Since no bilirubin was ever excreted in the urine or treated rats or controls, these drugs do not act by increasing urinary bilirubin excretion. The same doses of antiinflammatory agents were administered to rats immediately after bile duct ligation. All drugs prevented hyperbilirubin in bile-ligated rats. In these animals, a direct relation was found between blood bilirubin levels and urinary bilirubin excretion. Although prednisolone and nifenazone increased diuresis, they did not stimulate bilirubin excretion in the urine. Phenylbutazone and anthradione had no appreciable effect on diuresis. Thus, none of these agents acts by increasing urinary bilirubin excretion in the animal models studied. In bile-ligated rats the possibility that bilirubin might be excreted in the stools is ruled out. It is suggested that prednisolone, nifenazone, phenylbutazone, and anthradione prevent hyperbilirubinemia by inhibiting bilirubin synthesis in cells of the reticuloendothelial system.

4765 UNIQUE RELATIONSHIP BETWEEN BILIRUBIN TURNOVER AND BILIRUBIN CLEARANCE IN TYPE I CONGENITAL NONHEMOLYTIC JAUNDICE (CNJ). *(E.)* Berk, P. G.; Scharschmidt, B. F.; Waggoner, J. G.; White, S. C. (no affil.). *J. CLin. Invest.* 53(6): 6a, 1974.

4766 EFFECTS OF FEEDING ON FASTING HYPERBILIRUBINEMIA. *(E.)* Barrett, P. V. D. (Harbor Gen. Hosp., Torrance, Calif.). *Gastroenterology* 66 (4):662, 1974.

See also 4269, 4454, 4773,

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

4767 JAUNDICE AND RIFAMPICIN: CRITICAL STUDY. *(Fr.)* Nebout, T.; Dhumeaux, D.; Berthelot, P. (Henri Mondor Hosp., Creteil, France). *Nouv. Presse Med.* 3(12):733-736, 1974.

A questionnaire sent to 22 hospital centers and sanitoria showed that between January 1968 and March 1970, 86 patients developed jaundice during rifampicin therapy. An analysis was made of clinical findings of 70 patients (48 men and 22 women) for whom adequate clinical and histological information was available. Of these 70 patients, 30 were probably chronic alcoholics, 2 had cirrhosis confirmed by liver biopsy, and 5 others probably had cirrhosis. Patients were classified into 3 groups, depending on whether rifampicin was an unlikely cause of jaundice (24 patients), a possible cause (39 patients), or a probable cause (7 patients). In 5 of the 7 patients (6 women and 1 man) whose jaundice was probably caused by rifampicin, the repeated administration of rifampicin caused a recurrence of hyperbilirubinemia. The proportion of women in this group was significantly higher than in the group whose jaundice was not likely to be caused by rifampicin (23 men and 1 woman). The test of Mann and Whitney was used to compare differences in the period between institution of therapy and development of jaundice, duration of jaundice, maximum serum bilirubin concentration, maximum SGPT activity, and rifampicin dosage for these 3 groups of patients. No significant differences were found for any of the parameters studied between the group in which rifampicin was an unlikely cause of jaundice and that in which it was the probable cause.

4768 DETECTING THE EFFECTS OF AN ASSOCIATION OF RIFAMPICIN AND ISONIAZIDE ON THE HUMAN LIVER. *(Fr.)* Plomteux, G.; Heusghem, C.; Ferdinande, R.; Lecoq, A.; Winandy, A.; Parmentier, J. C. (Lab. Med. Chem. Toxicol., Liege, Belgium). *Nouv. Presse Med.* 3(12):727-732, 1974.

Liver function tests were performed systematically on 20 patients with extrapulmonary tuberculosis receiving 200 mg/day of isoniazid and/or 450 mg/day of rifampicin and on 30 patients with pulmonary tuberculosis receiving 300 mg/day of isoniazid and 450 mg/day of rifampicin. Of the 20 patients with extrapulmonary tuberculosis, 18 initially had no abnormalities in liver function and 16 never developed any. During administration of isoniazid alone 1 patient developed a slight temporary increase in serum γ-glutamyl transpeptidase and another had SGPT values which increased to 70 mIU and normalized after 10 weeks. No exacerbations occurred in the 2 patients who had evidence of abnormal liver function before institution of therapy. Of the 30 patients with pulmonary tuberculosis, 25 had no liver function disorders before institution of therapy and 13 never did develop any. Only 1 patient with initially normal findings developed large increases in SGOT and SGPT values shortly after institution of therapy, but liver function tests normalized rapidly despite continuation of therapy. Of the 5 patients with pulmonary tuberculosis who had liver function abnormalities initially, 3 with slight dysfunction improved and 1 had mild but permanent dysfunction over a 20-wk observation period. After rapid improvement initially, an 80-yr-old alcoholic developed jaundice which was rapidly fatal although tests for membrane permeability were only slightly abnormal. In addition to cirrhosis, this patient had cholelithiasis and biliary tuberculosis which would favor the development of jaundice. Since the period between institution of therapy and development of jaundice was long (81 days), it is unlikely that death resulted from a direct hepatotoxic effect. Thus, these findings showed that liver function abnormalities were significantly more common among patients with pulmonary tuberculosis than among those with extrapulmonary tuberculosis during administration of isoniazid and rifampicin.

4769 CROTALARIA INDUCED HEPATIC VENO-OCCLUSIVE DISEASE (VOD) DIAGNOSED IN THE UNITED STATES. *(E.)* Lyford, C. L.; Moeller, D. D. (Univ. Kansas Med. Ctr., Kansas City). *Gastroenterology* 66(4):734, 1974.

4770 SEQUENTIAL CHANGES OF IMMUNOFLUORESCENCE TITRES IN HEPATIC AMOEBIASIS. *(E.)* Mahajan, R. C.; Dutta, D. V.; Chitkara, N. L.; Agarwal, S. C.; Chhuttani, P. N. (Post-Grad. Inst. Med. Educ. Res., Chandigarh, India). *Ind. J. Med. Res.* 62(1):7-10, 1974.

4771 GUIDELINES FOR DIAGNOSIS OF THERAPEUTIC DRUG-INDUCED LIVER INJURY IN LIVER BIOPSIES. *(E.)* Scheuer, P. J.; Bianchi, L. (Roy. Free Hosp., Sch. Med., London, England). *Lancet* (7862):854-857, 1974.

See also 4718.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

4772 SERUM CHOLESTEROL ESTERIFICATION IN HUMAN LIVER-DISEASE: ROLE OF LECITHIN-CHOLESTEROL ACYLTRANSFERASE AND CHOLESTEROL ESTER HYDROLASE. *(E.)* Simon, J. B.; Kepkay, D. L.; Poon, R. (Dept. Med., Queen's Univ., Kingston, Ontario, Canada). *Gastroenterology* 66(4):539-547, 1974.

The net cholesterol-esterifying activity and activity of lecithin-cholesterol acyltransferase (LCAT) were simultaneously assayed in the sera of 25 patients with parenchymal liver disease, the former being measured using a colorimetric method and the latter being assessed using a ^{14}C-isotopic assay. There was close agreement between the two esterification rates, and the mean values were similar. Both esterifying activities were significantly lower than those in nine normal subjects and were correlated with the cholesterol ester concentrations and ester-free ratios *in vivo*. A direct assay for circulating hydrolase was developed, based on the incorporation of 4-^{14}C-cholesterol linoleate into autologous serum substrate. Electrophoretic and radiochromatographic analysis of the substrate sera suggested that most of the ^{14}C-ester was incorporated into lipoproteins, and the validity of the assay was confirmed by its ability to detect known cholesterol ester hydrolase activity in dog serum and hog pancreatic extract. No serum hydrolytic activity was detected in any of the patients, even those with severe hepatic disease. Thus, neither direct nor indirect evidence of circulating cholesterol ester hydrolase was obtained in patients with parenchymal liver disease. Low LCAT activity can entirely account for the impaired *in vitro* cholesterol esterification of hepatic disease and probably contributes to the cholesterol ester derangements seen *in vivo*.

4773 SIGNIFICANCE OF INTRAVASCULAR COAGULATION AND FIBRINOLYSIS IN ACUTE HEPATIC FAILURE. *(E.)* Hillenbrand, P.; Parbhoo, S. P.; Jedrychowski, A.; Sherlock, S. (Roy. Free Hosp., London, England). *Gut* 15(2):83-88, 1974.

Twenty-two patients with acute hepatic failure were studied to determine the incidence and magnitude of intravascular coagulation and fibrinolysis and their relation to the severity of bleeding and prognosis. The mean platelet count, Thrombotest, plasminogen activator, and plasminogen were reduced; the reduction in fibrinogen was not statistically significant. Fibrin/fibrinogen degradation products were only moderately increased. Hepatic fibrin deposition was not extensive, being present in 11 of 22 hepatic sections and appearing more in areas of confluent necrosis than in the sinusoids. The combination of increased fibrin/fibrinogen degradation products and decreased plasminogen activator, plasminogen, and thrombocytopenia is consistent with a diagnosis of intravascular coagulation and secondary local fibrinolysis. However, neither of these processes was severe. The severity of bleeding was related only to the plasminogen levels, and the prognosis was related only to the Thrombotest levels. There was no relation between the hepatic histological and hematological findings. Heparin therapy is not indicated in the routine management of acute hepatic failure, since intravascular coagulation is not severe and heparin may itself cause massive bleeding.

4774 IGM ANTI-I COLD AGGLUTININS IN HEPATITIS MONONUCLEOSA. *(E.)* Ambrus, M.; Bajtai, G.; Peley, I. (County Children's Hosp., Pecs, Hungary). *Folia Haematol. (Leipzig)* 100(4):429-435, 1973.

The immunologic examination of a 10-yr-old girl with hepatitis mononucleosa is presented. The diagnosis was confirmed by biopsy. Anti-I specific cold agglutinins in a titer 1:4096 were found in the patient's serum. The direct Coombs-test was positive at +4°C, but after the washing procedures positive results wer obtained with antihuman globulin serum and B_1C-complement antiserum, but not with monospecific anti-IgG and anti-IgM test sera. After the reduction of the serum with mercaptoethanol, a marked decrease in titer revealed the presence of IgM cold agglutinins, and immune precipitation analysis of the eluate also suggested that IgM type cold agglutinins were present. The eluate reacted with monospecific light chain antisera of the κ-type. The immune globulin concentration of the serum showed an elevation of IgM: 480 mg/100 ml. The test for Australia antigen was negative. The patient has been a normal I phenotype, and the pathologically increased cold agglutinin did not have a hemolytic effect. At the follow-up examination 6 weeks later this agglutinin could not be detected.

4775 EPIDEMIOLOGICAL-CLINICAL CORRELATES OF HEPATITIS B ANTIGEN SUBTYPES. *(E.)* Zuckerman, G. R.; Hacker, E. J.; Aach, R. D. (Washington Univ. Sch. Med., St. Louis, Mo.). *Gastroenterology* 66(4):408-414, 1974.

Hepatitis B antigen (HBAg) in the sera of 135 blood donors and patients with either acute viral hepatitis or chronic liver disease was subtyped. The HBAg in volunteer blood donors was predominantly subtype D (D:Y ratio of 7:1), whereas this subtype was only slightly more common than subtype Y in the sera of patients who had contracted hepatitis following the transfusion of blood from the volunteer donor population. Patients with "needle-stick hepatitis" had almost exclusively subtype Y-HBAg. In contrast, individuals with chronic liver disease had primarily subtype D-HBAg. The patients without recognized exposure ("sporadic hepatitis") had a D:Y ratio of 1.2:1. The age, race, sex, and socioeconomic status of the patients with sporadic hepatitis and subtype D-HBAg were similar to those of individuals with post-transfusion hepatitis. The epidemiological features of the patients with subtype Y-HBAg were similar to those of the patients with needle-stick hepatitis. Many of the former group had histories of close contact with illicit drug users.

4776 EXPOSURE AND IMMUNITY TO HEPATITIS-B VIRUS IN A LIVER UNIT. *(E.)* Reed, W. D.; Mitchell, C. G.; Eddleston, A. L. W. F.; Lee, W. M.; Williams, R.; Zuckerman, A. J. (King's Coll. Hosp., Med. Sch., London, England). *Lancet* 1(7858):581-583, 1974.

Using the leucocyte-migration test, cell-mediated immunity to hepatitis-B antigen (HBAg) was found in 12 (86%) of the 14 members of a liver-unit staff whose work involved frequent contact with purified antigen. In addition, 5 (36%) of them had hepatitis-antibody (HBAb), as indicated by radioimmunoassay. ndings in the other 29 staff members, none of om had knowingly been exposed to infection, did t differ significantly from those in age- and x-matched factory worker controls. Thirty percent the controls showed evidence of cell-mediated munity, and 7% had HBAb. Six patients recovering om acute HBAg-positive hepatitis also had both ll-mediated immunity and HBAb. However, only one the 86 staff members and factory controls tested d ever had clinical hepatitis, and liver function sts were normal. Frequent exposure to low-dose Ag by the oral route may result in a primary immunological response in the gastrointestinal mucosa thout viremia or liver disease; such immunity is kely to be protective.

77 THE LOCATION OF AUSTRALIA ANTIGEN IN THE LIVER AS DEMONSTRATED BY THE DIRECT IMMUNO-LUORESCENCE TECHNIQUE. *(It.)* De Bac, C.; Turbessi, .; Caramia, F.; Ricci, G. (Clin. Infectious Dis., niv. Rome, Italy). *Boll. Soc. Ital. Biol. Sper.* 8(23):1174-1177, 1972.

mmunofluorescence tests for Australia antigen (AuAg), erformed on liver biopsies from 9 AuAg-positive ubjects (7 normal carriers, 1 patient with acute erum hepatitis, and 1 with chronic hepatitis), ere positive in 7 cases. Intranuclear virus-like articles were found in liver tissue from 5 of the subjects examined. All 5 of these subjects had ositive immunofluorescence tests for AuAg. AuAg was ocated primarily in the cytoplasm and, to a more imited extent, in the nuclei of the hepatocytes. lthough these findings provide no information about he relation between AuAg and the virus-like particles, they do confirm that AuAg and virus particles re always found in association in the livers of uAg-positive subjects.

778 DETECTION OF CYTOMEGALOVIRUS ANTIBODIES IN AUSTRALIA-ANTIGEN-POSITIVE AND AUSTRALIA NTIGEN-NEGATIVE HEPATITIS. *(Ger.)* Baals, H.; ulow, B.; Freisenhausen, H. D.; Mai, K. (Inst. ed. Microbiol. Immunol., Univ. Hamburg, Germany). *erh. Dtsch. Ges. Inn. Med.* 78:928-930, 1972.

icro-complement-fixation tests for cytomegalovirus CMV) antibodies, performed on 588 normal blood onors in Hamburg, were positive in 166 (28.2%). hese antibodies were present in 89 of 398 donors ess than 35 yr old (22.4%) and in 77 of the 190 onors 35 yr old or older (40.5%). The difference n the incidence of CMV antibodies between these 2 roups is highly significant. Of 86 adult patients ith hepatitis, biopsies from 50 (58%) were positive or CMV antibodies. Thus the incidence of CMV antibodies is significantly greater in patients with epatitis than in the normal population of Hamburg. f the 86 patients with hepatitis, 38 had positive ests for Australia antigen (AuAg). CMV antibodies ere detected in liver biopsies from 71% of the uAg-positive patients and in only 48% of the AuAg-egative patients. This difference is significant and is even more pronounced in patients less than 35 yr-old. Similar results were obtained in a comparison of the incidence of CMV antibodies in 24 AuAg-positive asymptomatic blood donors. Although these findings show a statistically significant correlation between the incidence of CMV antibodies and AuAg, they provide no evidence of a pathogenetic or immunologic relation between them.

4779 TRANSAMINASE ABNORMALITIES IN INTRAVENOUS USERS, SMOKERS AND SNIFFERS OF HEROIN. *(E.)* Rosenthal, S. L. (Cutler Army Hosp., Fort Devens, Mass.). *Am. J. Gastroenterol.* 61(3):201-205, 1974.

4780 HEPATITIS B ANTIGEN (HBAg) AND ITS ANTIBODY (HBAb) IN HOSPITAL PATIENTS. *(E.)* Payne, R. W.; Barr, A.; Wallace, J. (Victoria Infirm., Glasgow, Scotland). *J. Clin. Pathol.* 27(2):125-129, 1974.

4781 SOME PARAMETERS OF ELECTROLYTE AND ACID-BASE BALANCE IN PATIENTS WITH ACUTE VIRAL HEPATITIS. *(Rus.)* Vasil'eva, G. D. (Kemerovo Med. Inst., USSR). *Sov. Med.* 36(5):150, 1974.

4782 TRANSITORY IMMUNE DEFICIENCY SYNDROME AND INFECTIOUS HEPATITIS. *(Ger.)* Schulte-Wissermann, H.; Lemmel, E. M.; Grosse-Wilde, H.; Mempel, W.; Loos, M. (Pediatr. Clin., Univ. Mainz, Germany). *Helv. Paediatr. Acta* 29(1):79-92, 1974.

4783 THE VIRAL ORIGIN OF SOME CASES OF HANOT AND MACMAHON'S DISEASE: ONE CASE OF CHOLESTATIC AND HYPERLIPIDEMIC VIRAL JAUNDICE PROGRESSING TO CHRONIC. *(Fr.)* Albot, G.; Camilleri, J. P.; Reynes, M. (no affil.). *Bull. Acad. Natl. Med.* 157(8):625-628, 1973.

4784 HL-A ANTIGEN DISTRIBUTION IN LIVER DISEASE. *(Ger.)* Freudenberg, J.; Erdmann, K.; Meyer zum Buschenfelde, K. H.; Forster, E.; Berger, J. (2nd Med. Clin., Univ. Mainz, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:645-646, 1973.

4785 CELLULAR IMMUNE REACTIONS TO HEPATITIS-ASSOCIATED ANTIGEN (HAA) AND HOMOLOGOUS LIVER-SPECIFIC ANTIGEN (HLP) IN ACUTE HAA-POSITIVE HEPATITIS. *(Ger.)* Knolle, J.; Meyer zum Buschenfelde, K. H.; Friedrichs, N.; Bolte, J. P. (2nd Med. Clin., Univ. Mainz, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:639-641, 1973.

4786 HEPATITIS: A VIRUS-INDUCED AUTOIMMUNE DISEASE. *(Ger.)* Berthold, H. (Med. Virol. Res. Group, Univ. Freiburg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:637-639, 1973.

4787 IMMUNOGLOBULINS IN ACUTE HEPATITIS. *(Ger.)* Stiess, G.; Berthold, H. (Med. Virol. Res. Group, Univ. Freiburg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:635-637, 1973.

4788 FOLLOWING HEPATITIS B ANTIGEN DURING AND AFTER ACUTE VIRAL HEPATITIS IN 1964 TO 1972. *(Ger.)* Alexander, M.; Scholz, V.; Wenzel, H. (Med. Clin., Free Univ., Berlin, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:977-979, 1973.

4789 CLINICAL AND BIOPSY FINDINGS IN AUSTRALIA ANTIGEN-POSITIVE BLOOD DONORS. *(Ger.)* Schlicht, I.; Hasse, W.; Alexander, M.; Weisse, W.; Sucker, U. (Westend Clin., Free Univ. Berlin, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:974-977, 1973.

4790 T-CELLS AND LYMPHOCYTOTOXINS IN TYPE B HEPATITIS AND HB ANTIGEN CARRIERS. *(E.)* DeHoratious, R. J.; Henderson, C.; Strickland, R. G. (Univ. New Mexico Sch. Med., Albuquerque). *Gastroenterology* 66(4):683, 1974.

4791 ASPECTS OF ACUTE VIRAL HEPATITIS IN ADDICTS AND NON-ADDICTS. *(E.)* Gazi, G.; Clowdus, D. B.; Szanto, P.; Steigmann, F. (Cook County Hosp., Chicago, Ill.). *Gastroenterology* 66(4):696, 1974.

4792 ABNORMALITIES OF HAPTOGLOBIN IN VIRAL HEPATITIS. *(E.)* Goldberg, S. J.; Smith, C. L.; Connell, A. M. (Univ. Cincinnati Med. Ctr., Ohio). *Gastroenterology* 66(4):701, 1974.

4793 THE PREVENTION OF POST-TRANSFUSION HEPATITIS. *(E.)* Koretz, R. L.; Ritman, S.; Mitchell, J.; Damus, K.; Arthur, M.; Kash, P.; Golub, L.; Juster, D.; Gitnick, G. L. (Univ. California, Los Angeles). *Gastroenterology* 66(4):726, 1974.

4794 CHRONIC SEQUELAE OF POST-TRANSFUSION HEPATITIS. *(E.)* Koretz, R. L.; Gitnick, G. L. (Univ. California, Los Angeles). *Gastroenterology* 66(4):726, 1974.

4795 HEPATITIS B ANTIGEN AND ANTIBODY IN ASYMPTOMATIC DRUG ADDICTS. *(E.)* Mangla, J. C.; Kim, Y. M.; Brown, M. R.; Schwob, D.; Hanson, S. E. (Monroe Community Hosp., Rochester, N.Y.). *Gastroenterology* 66(4):741, 1974.

4796 PREVALENCE OF HEPATITIS B ANTIGEN AND ANTIBODY AMONG HEROIN USERS IN VIET NAM. *(E.)* Robinson, M. G.; Ream, N. W.; Conrad, M. E.; Ginsberg, A. L. (Walter Reed Army Inst. Res., Washington, D.C.). *Gastroenterology* 66(4):765, 1974.

4797 NORMAL T-CELL MEDIATED IMMUNITY IN TYPE B ACUTE VIRAL HEPATITIS AND HEALTHY CARRIERS OF HEPATITIS B. *(E.)* Wicks, R. C.; Kohler, P. F.; Singleton, J. W. (Univ. Colorado Med. Ctr., Denver). *Gastroenterology* 66(4):798, 1974.

4798 A COMPARISON OF HEPATITIS-B ANTIGEN (HBAg) AND ANTIBODY (HBAb) PREVALENCE AMONG GROUPS OF HOSPITAL LABORATORY PERSONNEL. *(E.)* Wruble, L. D.; Masi, A.; Levinson, M.; Rightsell, W.; Bale, G.; Bertram, P. (Univ. Tennessee Sch. Med., Memphis). *Gastroenterology* 66(4):800, 1974.

4799 SERUM CHENODEOXYCHOLATE LEVELS IN HEPATITIS-B ANTIGEN CARRIERS. *(E.)* Schaefer, R. A.; Javitt, N. B.; Finlayson, N. D. C.; Prince, A. M. (Cornell Med. Coll., New York, N.Y.). *Gastroenterology* 66(4):865, 1974.

4800 PROLIFERATION OF VIRUS-LIKE PARTICLES IN LIVER BIOPSY AND EXPLANT TISSUES FROM A CASE OF UNRESOLVED VIRAL HEPATITIS. *(E.)* Dunn, A. E. G.; Ashcavai, M. W.; Peters, R. L.; Schweitzer, I. L. (Univ. Southern California Sch. Med., Los Angeles). *Gastroenterology* 66(4):883, 1974.

4801 PERSISTENCE OF HEPATITIS B ASSOCIATED ANTIGEN (HB Ag) AFTER ACUTE VIRAL HEPATITIS. *(E.)* Kaufman, D. G.; Hersh, T.; McDermott, R.; Lou, T. Y. (Rhode Island Hosp., Providence). *Gastroenterology* 66(4):888, 1974.

4802 PASSIVE IMMUNOTHERAPY IN HB-AG POSITIVE FULMINANT HEPATITIS. PRELIMINARY RESULTS. *(E.)* Opolon, P.; Gateau, P.; Salmon, C.; Caroli, J. (St. Antoine Univ. Hosp. Ctr., Paris, France). *Gastroenterology* 66(4):891, 1974.

4803 AUSTRALIA ANTIGEN IN SALIVA. *(E.)* Varma, R. R.; Brown, B. D.; Rothwell, D. (Med. Coll. Wisconsin, Milwaukee). *Gastroenterology* 66(4):896, 1974.

4804 INHIBITION OF LYMPHOCYTE CYTOTOXICITY IN ACUTE AND CHRONIC HEPATITIS. *(E.)* Wands, J. R.; Perrotto, J. L.; Alpert, E.; Isselbacher, K. J. (Massachusetts Gen. Hosp., Boston). *Gastroenterology* 66(4):898, 1974.

4805 THE ABSENCE OF SEROLOGIC RESPONSE TO HEPATITIS A IN PATIENTS WITH POSTTRANSFUSION HEPATITIS UNRELATED TO HEPATITIS B. *(E.)* Feinstone, S. M.; Kapikian, A. Z.; Alter, H. J.; Holland, P. V.; Purcell, R. H. (no affil.). *J. Clin. Invest.* 53(6):23a-24a, 1974.

4806 HEPATITIS B ANTIGEN (HB Ag) AND/OR ANTIBODY (HB Ag) IN FULMINANT HEPATITIS. PATHOGENIC AND PROGNOSTIC SIGNIFICANCE. *(E.)* Trepo, C. G.; Motin, J.; Robert, D.; Prince, A. M. (no affil.). *J. Clin. Invest.* 53(6):81a, 1974.

4807 HOSPITAL OUTBREAK OF HEPATITIS. I. DIFFERENCES IN PERSONAL HYGIENE AND IN PATIENTS ON PROLONGED HEMODIALYSIS. *(Sp.)* Perez Miranda, M.;

rad Celaya, F.; Errasti Goenaga, P.; Sanchez Ibar-
la, A.; de Prado Marcilla, J. M. (Fac. Med., Nav-
ra, Spain). *Rev. Esp. Enferm. Apar. Dig.* 42(5):
1-484, 1974.

See also 4384, 4737, 4820, 4838.

LIVER AND BILIARY TRACT

Chronic Hepatitis

308 VIRAL ANTIBODIES AND AUTOANTIBODIES IN
CHRONIC LIVER DISEASE. *(E.)* Triger, D.
; Kurtz, J. B.; Wright, R. (Royal South Hants
sp., Southampton, England). *Gut* 15(2):94-98, 1974.

ghly significant elevations in the titres to the
ree viruses, measles, rubella, and cytomegalovirus,
re noted in 19 patients (18 females and 1 male,
ed 13 to 81 yr) with chronic active hepatitis.
gnificant elevation in antibody titres to cyto-
galovirus in cirrhotic patients (24 females and 12
les, aged 9-77 yr) was noted. Of these 36 cir-
otic patients, 20 had cirrhosis secondary to al-
hol, 3 had postnecrotic cirrhosis, and 13 had
imary biliary cirrhosis. The titres observed in
e patients and in controls were all within normal
mits to herpes simplex, varicella/zoster, parain-
luenza I, and Mycoplasma pneumoniae. A good corre-
ation was obtained between the immunofluorescent
toantibodies and measles antibody titres, a fair
rrelation with rubella antibody titres, and none
th cytomegalovirus antibody titres. No correla-
on was noted between antimitochondrial antibody
tres and any of the viral antibodies. Absorption
the sera with the measles antigen grown in Vero
lls resulted in the removal of most of the measles
tibody together with the removal of the bulk of
e autoantibodies. Vero cells alone absorbed out
e autoantibodies to a similar extent without sig-
ificantly affecting the measles antibody titre.
us it is suggested that the correlation between
asles antibody titres and autoantibodies is un-
ikely to be due to cross-reacting antigens.

309 MULTIVARIATE ANALYSIS OF SERUM PROTEIN
ASSAYS IN CHRONIC HEPATITIS AND POSTNECROTIC
RRHOSIS. *(E.)* Agostoni, A.; Marasini, B.;
abilini, R.; Del Ninno, E.; Pontello, M. (Inst.
d. Pathol., Univ. Milan, Italy). *Clin. Chem.*
(4):428-429, 1974.

e concentration of 9 proteins in the sera of 98
tients, 29 with chronic persistent hepatitis, 40
th chronic aggressive hepatitis, and 29 with post-
crotic cirrhosis, were studied. The use of a
mited set of serum protein assays for differential
agnosis of these syndromes was tested by multi-
ariate discriminant analysis. Variables which were
atistically significant in contributing to the
scrimination between chronic persistent hepatitis
d chronic aggressive hepatitis were pre-albumin,
gG, IgA, and IgM. A 23% error was found when
ronic persistent hepatitis and chronic aggressive
epatitis were classified by means of the discrimi-
ant based on the 3 Ig only. When pre-albumin was
troduced as a 4th variable, the classification error was only slightly reduced to 21.7%. To discriminate between chronic aggressive hepatitis and postnecrotic cirrhosis, albumin and pre-albumin were most significant, while orosomucoid, β_{1A}-globulin, and IgA ranked next in significance. A 10% error was noted when discrimination was based on all 5 variables. By measuring pre-albumin, albumin, and IgA in serum, chronic aggressive hepatitis and postnecrotic cirrhosis could be differentiated in 89% of the cases. Similar percentages were obtained with albumin, orosomucoid, and IgA; or with albumin, α_{1A}-globulin and IgA.

4810 MICROSOMAL ANTIBODIES IN ACTIVE CHRONIC HEPATITIS AND OTHER DISORDERS. *(E.)* Rizzetto, M.; Swana, G.; Doniach, D. (Mauriziano Hosp., Turin, Italy). *Clin. Exp. Immunol.* 15(3):331-344, 1973.

An autoantibody reacting with microsomal membranes has been characterized by a distinctive immunofluorescence pattern on proximal renal tubules and hepatocytes. The microsomal nature of the antigen was demonstrated by absorption and quantitative complement fixation studies. These results showed the microsomal membrane antibodies are distinct from mitochondrial antibodies found in primary biliary cirrhosis. Microsomal antibodies have been detected in high titers in sera from 16 patients; 12 of these had liver disorders. These consisted of active chronic hepatitis (8 cases); halothane jaundice (2); hepatoma (1); a systemic autoimmune disorder which included chronic hepatitis, hepatomegaly, abnormal liver function tests, a goiter with thyroid antibodies, and a chronic false-positive test for syphilis (1); and an undiagnosed neurological disorder with severe demyelination and subclinical liver disease with periportal lymphoid infiltrates. The titer of these antibodies varied from 1:40 to 1:800 in these 16 patients. Although none of the 8 patients tested repeatedly became negative, antibody titers did decrease in 2 cases. One decrease was associated with a clinical remission of active chronic hepatitis, while another was accompanied by progression to inactive cirrhosis. Microsomal membrane antibodies, although rare, may provide a serological marker for a small proportion of active chronic hepatitis cases differing in several respects from other recognized subgroups in this disease.

4811 CHARACTERIZATION OF THE MICROSOMAL ANTIGEN RELATED TO A SUBCLASS OF ACTIVE CHRONIC HEPATITIS. *(E.)* Rizzetto, M.; Bianchi, F. B.; Doniach, D. (Middlesex Hosp. Med. Sch., London, England). *Immunology* 26(3):589-601, 1974.

Rat liver microsomes were subfractionated into rough and smooth membrane components. Antigen in both subfractions reacted with sera from active chronic hepatitis patients in complement fixation and fluorescence absorption tests. The antigenic determinant appeared to be located on lipoprotein membrance since phospholipases, proteinases and solubilizing procedures reduced the complement fixing activity of the microsome preparations. Further, the antigen was not dependent upon intact ribosomal RNA since treatment with RNase or with EDTA had no effect. IgG isolated from serum of the hepatitis patients and conjugated with peroxidase appeared to react in immunoelectronmicroscopy tests with both the ribosomes and the membrane of the rough endothelial reticulum in rat liver and kidney tissues, but not with ribosomes of smooth endothelial reticulum in these tissues, due, possibly, to destruction of delicate membranes of the latter during preparation of the tissue sections. The ultrastructural appearance of the antigen-antibody interaction was clearly distinguished from that of the mitochondrial primary biliary cirrhosis system.

4812 AUSTRALIA ANTIGEN AND AUTOANTIBODIES IN CHRONIC LIVER DISEASE. *(Ger.)* Muller, R.; Kalden, J.; Deicher, H. (Med. Coll., Hannover, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:926-928, 1972.

Determinations were made of Australia antigen (AuAg), antinuclear and antimitochondrial antibodies, anti-smooth muscle antibodies, and anti-γ-globulin factors in serum from 93 patients with chronic aggressive hepatitis and/or cirrhosis. AuAg was detected in 40 patients (16 with chronic aggressive hepatitis and 24 with cirrhosis) and was absent in 53. Although higher titers were more common in chronic aggressive hepatitis than in cirrhosis, there was no difference between these 2 groups in the frequency of AuAg. Autoantibodies and anti-γ-globulin factors were found in about the same percentage of AuAg-positive and AuAg-negative patients. Follow-ups of AuAg and autoantibodies for more than 2 yr in 8 patients (5 AuAg-positive and 3 AuAg-negative) showed that autoantibodies were not continuously present during this period. No relation was found between the presence or absence of autoantibodies and the course of the disease. Serum transaminase values and IgG levels normalized when AuAg disappeared in a patient who was AuAg-positive for 20 months. The liver then showed almost no sign of inflammation, and no AuAg could be detected in a biopsy by immunofluorescence. These results indicate that there is no justification for classifying patients with chronic liver disease into mutually exclusive antinuclear factor-positive and AuAg-positive groups. The presence of autoantibodies is considered a nonspecific phenomenon associated with chronic liver disease rather than a sign of autoimmune processes occurring in the liver.

4813 OCCURRENCE OF AUSTRALIA ANTIGEN AND ANTINUCLEAR FACTORS IN CHRONIC AGGRESSIVE HEPATITIS. *(Ger.)* Berthold, H.; Maas, D.; Oehlert, W.; Merz, K. P.; Dischler, W. (Hyg. Inst., Univ. Freiburg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:922-926, 1972.

Using the complement-fixation test and immunoelectrophoresis, AuAg was determined in sera from 42 patients with chronic aggressive hepatitis and antinuclear factor and in 23 patients with chronic aggressive hepatitis and no antinuclear factor. Although the complement-fixation test was positive in 28 patients with antinuclear factor, AuAg was detected by both methods in only 3 cases. In contrast, AuAg was present in 16 of the 23 patients who were negative for antinuclear factor. This difference is highly significant. Very high γ-globulin levels were found in most of the patients with antinuclear factor and positive complement-fixation tests who had negative tests for AuAg on immunoelectrophoresis. Since test sera from transfused hemophiliacs contain many antibodies against the various antigenic determinants of IgG in addition to AuAg, there may be a relation between the patients' γ-globulin and isoantigens resulting from multiple transfusion in the test sera. These findings also suggest that 2 or more mechanisms are involved in the development of chronic aggressive hepatitis.

4814 IMMUNOGLOBULIN CHANGES ASSOCIATED WITH D-PENICILLAMINE THERAPY OF CHRONIC ACTIVE LIVER DISEASE. *(E.)* Benson, G. D. (Jefferson Med. Coll., Philadelphia, Pa.). *Gastroenterology* 66(4):879, 1974.

4815 GROUNDLESS HEPATOCYTES IN HEPATITIS B ANTIGEN (HB Ag) POSITIVE CHRONIC HEPATITIS AND CIRRHOSIS. *(E.)* Gerber, M. A.; Vernace, S.; Popper, H. (VA Hosp., Bronx, N.Y.). *Gastroenterology* 66(4):885, 1974.

4816 THE ASSOCIATION OF TRANSIENT PURE RED CELL APLASIA WITH CHRONIC VIRAL HEPATITIS. *(E.)* Gold, M. S.; Sears, D. A.; George, J. N.; Krantz, S. B. (Univ. Texas Med. Sch., San Antonio). *Gastroenterology* 66(4):885, 1974.

4817 IMMUNOLOGIC HEPATIC INJURY. *(E.)* Popper, H.; Paronetto, F. (Mt. Sinai Sch. Med., City Univ. New York, N.Y.). *Verh. Dtsch. Ges. Inn. Med.* 78:790-797, 1972.

See also 4461, 4775, 4784, 4794, 4799, 4801, 4804, 4826.

Alcoholic Liver Disease

4818 ELEVATED ANTIHEMOPHILIC FACTOR (AHF, FACTOR VIII) PROCOAGULANT ACTIVITY AND AHF-LIKE ANTIGEN IN ALCOHOLIC CIRRHOSIS OF THE LIVER. *(E.)* Green, A. J.; Ratnoff, O. D. (Case Western Reserve Univ. Sch. Med., Cleveland, Ohio). *J. Lab. Clin. Med.* 83(2):189-197, 1974.

Antihemophilic factor procoagulant activity and levels of antihemophilic factor-like antigen were measured in 22 patients (all males, aged 21-72 yr) with clinical evidence of advanced hepatic cirrhosis. Liver function tests showed that alkaline phosphatase ranged from 18 to 456 IU; SGOT, 50 to 285 IU; total bilirubin, 0.9 to 30.0 mg/100 ml. Elevated levels of procoagulant activity were associated with elevated levels of antihemophilic factor-like antigen as detected by quantitative immunoelectrophoresis. In 13 patients, the elevation of the antigen was significantly higher than that of procoagulant activity. The antigen in cirrhotic plasma was not distinguishable from that in normal human plasma either immunologically or by its filtration characteristics on agarose columns of agarose. An antibody prepared against cirrhotic antihemophilic factor was indistinguishable from that prepared against normal human antihemophilic factor. The results indicate that functional and antigenic antihemophilic factors are the same or closely similar molecules.

4819 ESOPHAGEAL MOTOR ABNORMALITIES IN CHRONIC ALCOHOLICS (cA) WITH AND WITHOUT PERIPHERAL NEUROPATHY (PN). *(E.)* Capistrano, D.; Antonelle, M.; Pitchumoni, C. S.; Balthazar, E. (Metropolitan Hosp. Ctr., New York, N.Y.). *Gastroenterology* 66 (4):671, 1974.

4820 ROLE OF HEPATITIS B VIRUS IN THE GENESIS OF ALCOHOLIC LIVER DISEASE. *(Fr.)* Richer, G.; Houle, G.; Morcos, N.; Montambault, J.; Turgeon, F.; Marleau, D. (St. Luc Hosp., Montreal, Canada). *Union Med. Can.* 103(6):1027-1032, 1974.

4821 STUDIES ON THE INDUCTION OF DRUG-METABOLIZING ENZYMES IN CHRONIC ALCOHOLICS. *(Ger.)* Gundert-Remy, U.; Marquardt, R.; Andritsch, F.; Weber, E. (Med. Clin., Univ. Heidelberg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:907-908, 1973.

4822 IN VITRO AND IN VIVO STUDIES OF CELLULAR IMMUNITY IN ALCOHOLIC CIRRHOSIS. *(E.)* Berenyi, M. R.; Straus, B.; Cruz, D. (Beth Israel Med. Ctr., New York, N.Y.). *Gastroenterology* 66(4):664, 1974.

4823 A QUANTITATIVE DEFECT IN THYMUS-DERIVED LYMPHOCYTES (TL) IN ALCOHOLIC LIVER DISEASE (ALD). *(E.)* Bernstein, I. M.; Webster, K. H.; Strickland, R. G. (Univ. New Mexico Sch. Med., Albuquerque). *Gastroenterology* 66(4):666, 1974.

4824 PERITONEAL FLUID CULTURE AND LEUKOCYTE COUNT STUDIES IN ALCOHOLIC LIVER DISEASE WITH ASCITES. *(E.)* Kline, M.; McCallum, R.; Guth, P. (VA Wadsworth Hosp. Ctr., Los Angeles, Calif.). *Gastroenterology* 66(4):724, 1974.

4825 STEROIDS IN ALCOHOLIC HEPATITIS: SURVIVAL RELATED TO BIOPSY FEASIBILITY. *(E.)* Shumaker, J. B.; Resnick, R. H.; Galambos, J. T.; Iber, F. L. (Tufts Univ. Sch. Med., Boston, Mass.). *Gastroenterology* 66(4):778, 1974.

4826 LIVER HISTOLOGY IN ABUSERS OF BOTH OPIATES AND ALCOHOL. *(E.)* Thomas, E.; Rosenthal, W. S.; Delman, M. R. (New York Med. Coll. - Metropolitan Hosp. Ctr., N.Y.). *Gastroenterology* 66(4):789, 1974.

4827 FURTHER CHARACTERIZATION OF AN INHIBITOR OF LEUKOCYTE CHEMOTAXIS (ILC) IN ALCOHOLIC LIVER DISEASE (ALD). *(E.)* Van Epps, D. E.; Bernstein, I. M.; Strickland, R. G.; Williams, R. C. (Univ. New Mexico Sch. Med., Albuquerque). *Gastroenterology* 66(4):792, 1974.

4828 THE RELATIONSHIP OF ETHANOL (E) AND ITS OXIDATION PRODUCTS TO HEPATIC STEATOSIS (HS). *(E.)* Richards, R. G.; Mendenhall. C. L.; Trick, T. (Univ. Cincinnati Coll. Med., Ohio). *Gastroenterology* 66(4):892, 1974.

4829 INCREASE IN PLASMA α-LIPOPROTEINS IN CHRONIC ALCOHOLICS AFTER ACUTE ABUSE. *(E.)* Johansson, B. G.; Medhus, A. (Malmo Gen. Hosp., Sweden). *Acta Med. Scand.* 195(4):273-277, 1974.

See also 4176, 4270, 4742, 4846,

4830 THE PORTAL PRESSURE-BLOOD VOLUME RELATIONSHIP IN CIRRHOSIS. *(E.)* Zimmon, D. S.; Kessler, R. E. (VA Hosp., New York, N.Y.). *Gut* 15(2):99-101, 1974.

Portal pressure-blood volume curves were derived in 13 cirrhotic patients with portal hypertension and esophageal or gastric varices by measuring portal pressure at 2 levels of blood volume. Portal pressure varied directly with blood volume. In 7 patients where portal pressure was measured at 3 levels of blood volume separated by 500 ml or more, the portal pressure-blood volume relation was approximately linear. It is hoped that patients with portal hypertension at risk from varieceal hemorrhage may be more precisely managed if the relation between portal pressure and blood volume is emphasized. Knowledge of this relation may help to cope with the hazards of plasma volume depletion leading to hepatic and renal malfunction and plasma volume excess leading to increased portal pressure and its complications.

4831 PLASMA AND URINARY AMINO ACIDS IN INDIAN CHILDHOOD CIRRHOSIS. *(E.)* Vij, S. C.; Maitrya, B. B.; Vij, A. (E. P. Med. Coll., Bikaner, India). *Indian Pediatr.* 9(5):323-324, 1974.

Plasma and urinary amino acids, serum total proteins, serum albumin and globulin fractions were studied in 10 infants with Indian childhood cirrhosis and 10 normal controls. In cirrhotic infants, serum total proteins were not changed significantly but their albumin/globulin ratio was decreased. Increased plasma amino acid levels were associated with aminoaciduria in the cirrhotic infants. These changes could be due to liver function disorders. As a result of this the liver might not be able to synthesize albumin from available plasma amino acids, thereby causing increased plasma amino acid levels and aminoaciduria.

4832 COMPARISON OF RESULTS OF LONG-TERM TREATMENT OF CHRONIC HEPATIC ENCEPHALOPATHY WITH LACTULOSE AND SORBITOL. *(E.)* Rodgers, Jr., J. B.; Kiley, J. E.; Balint, J. A. (Albany Med. Coll., N.Y.). *Am. J. Gastroenterol.* 60(5):459-466, 1973.

Alternate lactulose (50% solution) and sorbitol (60% solution) therapy was employed in a long-term, double-blind study of 3 patients (1 woman and 2 men, aged 60-75 yr) with chronic hepatic encephalopathy. The patients were continued on a 50 g/day protein diet and for the first year were given a 2-month course of one medication (20-30 ml, 3 times/day) followed by a 2-month course on the other. During the 2nd yr, a control period of 2-3 weeks separated treatment periods. Neomycin (2 g/day) was prescribed for mental confusion. A complete blood count and serum electrolytes, blood ammonia, and liver function tests were performed monthly. Periodic electroencephalograms were also done. No patient developed hepatic coma while on either medicine, although 1 required neomycin supplement during 3 of 5 treatment periods with sorbitol. None of the 3 required neomycin during lactulose treatment periods. In 1 patient lactulose seemed more beneficial than sorbitol, as determined by clinical and laboratory criteria. A much larger group of patients must be studied to demonstrate whether lactulose is superior to sorbitol in the treatment of hepatic encephalopathy.

4833 ROENTGENOLOGIC DEMONSTRATION OF SPONTANEOUS REVERSAL OF PORTAL BLOOD FLOW IN CIRRHOSIS AND PRIMARY CARCINOMA OF THE LIVER. *(E.)* Okuda, K.; Moriyama, M.; Yasumoto, M.; Jinnouchi, S.; Shimokawa, Y.; Nakayama, T.; Kanda, Y.; Fukyuama, Y.; Musha, H.; Kuratome, S.; Nakashima, T. (Chiba Univ. Sch. Med., Japan). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 119(2):419-428, 1973.

Forty-nine patients with liver cirrhosis and 47 with hepatoma were subjected to at least 2 types of angiographic examination, combined with a barium swallow study designed to detect esophagogastric varices. The angiographic examinations consisted of splenoportography, celiac and superior mesenteric arteriography, hepatic venography, umbilicoportography, celiac and superior mesenteric arteriography, hepatic venography, umbilicoportography, and endoscopy. In 1 cirrhotic patient, an unequivocal retrograde portal blood flow was demonstrated. In 1 hepatoma patient, whose portal vein was visualized during celiac arteriography, the portal flow was to-and-from, the direction depending on the force of the contrast medium injection. In 4 hepatoma patients in whom retrograde portal flow was observed, there were tumor thrombi in the portal vein and, in 1 patient, in the collateral veins. Retrograde portal flow does therefore occur in cirrhosis of the liver, although very rarely; it occurs more often in hepatoma, perhaps due to arterial neovascularization and arteriovenous communications.

4834 USE OF HEMODYNAMIC SELECTION CRITERIA IN THE MANAGEMENT OF CIRRHOTIC PATIENTS WITH PORTAL HYPERTENSION. *(E.)* Smith, G. W. (Baltimore City Hosp., Md.). *Ann. Surg.* 179(5): 782-790, 1974.

Hemodynamic staging was used to study 130 patients (85 males and 45 females, average age 50 yr) with cirrhosis of the liver and portal hypertension. In stage I portal flow is normal; in stage II it is moderately reduced; in stage III it is severely curtailed or even reversed. Both preoperative and intraoperative data were used to judge the hemodynamic stage. Of the 130 patients, nutritional cirrhosis was diagnosed in 90 cases, post-necrotic cirrhosis in 30, and other liver disease in 9. Based largely on hemodynamic selection criteria, 66 patients had a portal-systemic shunt, 24 had a non-shunt operative procedure, and 40 were managed medically. The type of shunt operation was portacaval in 61, mesocaval in 3, and splenorenal in 2. The striking clinical feature was a high operative mortality rate, 35% for shunted patients and 38%

for those treated with a non-shunt operation. Even so, the long-term survival was reasonably good for all three groups of patients, best for those managed by non-surgical means. It was concluded that therapeutic choice based upon hemodynamic criteria decreased the incidence of encephalopathy and eliminated the risk of death from liver failure in selected groups of patients. It was also concluded that, among shunted patients, hemodynamic selection did not improve either operative risk or long-term survival. Finally, it was found that when hemodynamic staging was used to select patients considered hemodynamically unsuitable for a portal-systemic shunt, such considerations led to no improvement in the late results. In an overall consideration of the expense and risk involved in the use of such techniques, and their lack of any definitive clinical benefit, the justification for their continued use is open to question.

4835 FAMILIAL CIRRHOSIS. *(E.)* MacSween, R. N. M.; Fell, G. S. (Dept. Pathol., Univ. Glasgow, Scotland). *Scot. Med. J.* 19(1): 25-30, 1974.

A history is presented for a family in which 7 of 12 sibs died of cirrhosis in adolescence. The histological features of the cirrhosis in these 7 cases were suggestive of Wilson's disease. Two first cousins in this family died in infancy, with a diagnosis of galactosemia, a disease in which cirrhosis may occur. The diagnosis was established by chromatographic demonstration of galactosuria with generalized aminoaciduria. The copper content of the liver was 1099 μg/g dry weight in 1 of the children with histological features of Wilson's disease, compared with 128 μg/g in a "control" cirrhotic liver. The familial occurence of two rare metabolic disorders known to be associated with hepatic cirrhosis has not been previously reported.

4836 SELECTIVE SUPERIOR MESENTERIC ARTERIAL INFUSION OF VASOPRESSIN DURING PORTOSYSTEMIC SHUNT OPERATIONS. *(E.)* Nusbaum, M.; Younis, M. T.; Baum, S.; Blakemore, W. S. (Grad. Hosp., Univ. Pennsylvania, Philadelphia). *Am. J. Surg.*127(1): 35-39, 1974.

Mesenteric arterial infusion of vasopressin (100 U diluted in 500 cc normal saline) as an adjunct during portosystemic shunt surgery was evaluated in a series of 18 patients. Ten had portacaval shunts, 6 had splenorenal shunts, and 2 had mesenteric-caval shunts with an interposed Dacron graft. In 12 patients the catheter was placed in the superior mesenteric artery 1 hr before surgery and then infused with vasopressin for arteriographic assessment of the vascular response. These patients were subsequently taken to the operating room. Bleeding from varices had been controlled in these patients by prior infusion. The other 6 patients were infused with vasopressin from 3 days to 2 weeks without interruption from the onset of bleeding through the shunt operation. As a result of vasopressin infusion, the collateral circulation, at the incision and in the abdomen and retroperitoneum, was markedly diminished. Dissection was performed with greater facility, less blood loss, and shorter operating time. There were 2 deaths in the group. It is concluded that the use of superior mesenteric arterial vasopressin infusion during portosystemic shunts permits more rapid performance of the operation with a relatively avascular field, with fewer anesthetic and intraoperative complications, and without impairment of the hepatic arterial circulation.

4837 SPONTANEOUS REVERSAL OF PORTAL FLOW IN PATIENTS WITH BLEEDING VARICES TREATED BY EMERGENCY PORTACAVAL SHUNT. *(E.)* Charters, III, A. C.; Chandler, J. G.; Condon, J. K.; Grambort, D. E.; Levin, S. E.; Modafferi, T. R.; Orloff, M. J. (Sch. Med., Univ. California, San Diego). *Am. J. Surg.* 127(1):25-29, 1974.

Spontaneous reversal or stagnation of portal blood flow occurred in 32% of 110 patients undergoing emergency portacaval shunt for bleeding esophageal varices, a much higher incidence than has been noted previously. The survival rate was lower in patients with reversed portal flow (37%) than in those with prograde portal flow (56%). The incidence of encephalopathy on admission and that of protein-related encephalopathy after shunt were twice as high in the survivors who had reversed portal flow. These findings indicate that factors other than magnitude of portal flow diversion are important in determining the response to portacaval shunt.

4838 THE VIRAL ORIGIN OF SOME FORMS OF CHRONIC INTRAHEPATIC CHOLESTASIS: A CASE OF CHOLESTATIC JAUNDICE WITH HYPERLIPIDEMIA DEVELOPING INTO A CHRONIC CONDITION. *(Fr.)* Albot, G.; Camilleri, J. P.; Reynes, M. (Hotel Dieu, Paris, France). *Sem. Hop. Paris* 49(52):3481-3495, 1973.

A 61-yr-old woman developed jaundice and symptoms of viral hepatitis 8 days after onset of an influenza-like illness. SGOT values were higher (1000 IU) than those observed in obstructive jaundice. Cholestasis was manifested by pruritis which developed 15 days after onset of jaundice, total bilirubin concentrations of 2 mg/100 ml (primarily conjugated), elevated serum alkaline phosphatase activity (34 Bodansky U), and increased BSP retention. Increases in total lipids (40 g/liter) and cholesterol (20 g/liter) were observed somewhat later. At laparoscopy and laparotomy the liver was green in color and somewhat enlarged. No evidence of cholelithiasis was found and extrahepatic biliary tract was normal. Examination of liver biopsies revealed marked portal and periportal sclerosis, cholestasis with xanthomatosis of Kupffer's cells, almost complete destruction of the portal bile ducts, changes in the bile pole of the hepatocytes, and considerable intralobular histiocytosis. Cholestasis failed to respond to corticosteroids or bile drainage, and prothrombin values progressively decreased. Melena developed and persisted despite therapy, although improvement occurred in clotting factors after administration of ethamsylate and vitamin K_1. The patient went into hepatic coma and died less than 1 yr after onset of symptoms. Although this patient had no antimitochondrial antibodies, which are present in 90-95% of patients with primary biliary cirrhosis, other findings were compatible with biliary cirrhosis. This suggests that viral hepatitis can lead to biliary cirrhosis. Another possibility is that, in unusual cases, cholestatic viral hepatitis may lead to chronic intrahepatic cholestasis with terminal acholangia.

4839 RELATIONS BETWEEN THE INTRAERYTHROCYTE CONCENTRATION OF 2,3-DIPHOSPHOGLYCERATE (DPG) AND THE HALF-SATURATION VALUE (T_{50}-VALUE) IN PATIENTS WITH CIRRHOSIS. *(Ger.)* Baltzer, G.; Auer, H.; Arndt, H.; Englhardt, A.; Martini, G. A. (Med. Clin., Univ. Marburg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1353-1356, 1972.

Since the O_2-dissociation curve is shifted to the right by increasing concentrations of 2,3-diphosphoglycerate (2,3-DPG) in the erythrocytes, measurements were made of the 2,3-DPG and ATP contents of erythrocytes in 27 patients with cirrhosis to determine whether this might account for decreased arterial O_2 saturation. Controls consisted of 17 subjects with normal liver and pulmonary function. Although no appreciable differences were found in the ATP content of erythrocytes in cirrhotics and controls, the mean 2,3-DPG content was significantly higher ($22.8 \pm 6.6 \times 10^{-4}$ μmol/ml) in cirrhotics than in controls ($16.5 \pm 4.9 \times 10^{-4}$ μmol/ml). Since no significant differences were found between the mean half-saturation values for the O_2 dissociation curve in 14 normal subjects and 30 cirrhotics, no relation was found between the erythrocyte 2,3-DPG content and the T_{50} values in cirrhotics. However, the erythrocyte 2,3-DPG content was inversely related to hemoglobin concentrations.

4840 EFFECT OF LARGE DOSES OF ESSENTIAL PHOSPHOLIPIDS, ADMINISTERED I.V. AND ORALLY, ON PROTEIN AND LIPID METABOLISM AND ON ENZYME ACTIVITIES IN PATIENTS WITH CHRONIC LIVER DISEASE. *(Ger.)* Muting, D.; Dohn, P.; Reikowski, J. (Prof. Kalk Clin. Liver Dis., Dig. Metabolic Dis., Bad Kissingen-Hausen, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1389-1392, 1972.

Blood ammonia and free phenol levels decreased significantly and blood urea concentrations increased slightly after i.v. injection of 1000 mg essential phospholipids (EPL) in 24 patients with cirrhosis (12 with and 12 without portal hypertension). EPL apparently increases conjugation of ammonia with glutamic acid to produce nontoxic glutamine and increases free phenol conjugation by increasing glucuronic and sulfuric acid synthesis. Administration of 2700 mg/day of EPL p.o. to 43 patients with chronic liver disease (27 with cirrhosis and 16 with chronic aggressive hepatitis) for an average of 8 months significantly increased the Quick value and significantly decreased blood ammonia levels and BSP retention. In addition, triglyceride levels decreased significantly in patients with cirrhosis. In 31 patients with histologically confirmed fatty liver, EPL (1000 mg i.v. for an average of 6 weeks) significantly reduced blood ammonia, total lipids, total cholesterol, triglyceride, succinate dehydrogenase, and glutamate dehydrogenase levels. A slight transient rebound effect was observed when 4 of these patients were transferred to EPL given p.o. Complete regression of fatty liver occurred in 1 of these patients. When EPL was administered i.v. in large doses, 5 patients developed severe abdominal pain and diarrhea which disappeared after reduction of the dose. No side effects occurred after p.o. administration of EPL.

4841 CHANGES IN SOME STRUCTURAL LIPIDS AND FATTY ACIDS IN THE HUMAN BRAIN IN TOXIC ALCOHOLIC CIRRHOSIS. *(Ger.)* Lesch, P. (Med. Coll., Hannover, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1310-1313, 1972.

Lipids were isolated from the cerebral medulla and cortex of 6 patients who had died of complications of alcoholic cirrhosis. After separation into fractions, fatty acids were determined by gas chromatography and the results compared with those obtained previously on normal brains. In cirrhotic patients decreases were observed in neutral lipids and cerebrosides in both the medulla and cortex. Lecithin, phosphatidylethanolamines, and cholesterol decreased in the medulla, and the sphingomyelin content remained unchanged in both the medulla and cortex. In the cerebroside fraction stearic acid decreased significantly in the medulla but not in the cortex, while nervonic acid (*cis*-15-tetracosenoic acid) decreased in the cortex and increased in the medulla. Relative increases occurred in the contents of myristic, palmitic, and oleic acids in the cortex; palmitic and oleic acid contents decreased in the medulla, and the content of acids with more than 21 C increased. Changes in the fatty acid composition of sphingomyelin paralleled those which occurred in the cerebroside fraction, but the fatty acid composition of lecithin remained unchanged. The palmitic acid content of phosphatidylethanolamines increased from 7.5% to 12.5% in the medulla and from 6.2% to 18.2% in the cortex, while the stearic acid content decreased from 38% to 32% in the cortex and from 23% to 8% in the medulla. The docosatetraenoic acid content increased from 8.0% to 12% in the medulla but remained largely unchanged, along with the arachidonic and docosahexenoic acid contents, in the cortex. Thus, the chain-length of fatty acids generally decreased in the cortex and increased in the medulla along with a slight increase in the content of polyunsaturated acids.

4842 INVESTIGATIONS OF CHANGES IN BILE ACID METABOLISM IN HEPATIC COMA AND PRECOMA. *(Ger.)* Erb, W.; Haase, A.; Walczak, M.; Leuschner, U. (Ctr. Intern. Med., Univ. Frankfurt/Main, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1401-1402, 1972.

Bile acid analyses were performed by gas chromatography on serum from 4 cirrhotic patients in hepatic coma, on liver tissue from 8 patients who had died in hepatic coma, and on serum from normal controls. Serum bile acid concentrations had increased to almost 4000 μg/100 ml in hepatic coma, while a relative decrease was noted in secondary bile acids, particularly deoxycholic acid. Both absolute and relative increases occurred in chenodeoxycholic acid, while cholic acid underwent a relative decrease. The total content of bile acids in liver tissue from patients who had died of hepatic coma was about 1/2 of the normal values. The largest decreases occurred in secondary bile acids and cholic acid, with a far smaller decrease in chenodeoxycholic acid. No decrease occurred in lithocholic acid in either serum or liver, but deoxycholic acid was not detected in the livers of 5 of the 8 patients who had died of hepatic coma. This suggests that bacterial dehydroxylation of chenodeoxycholic to deoxycholic acid no longer occurs since bile acids are not being secreted into the intestine. The ratio of bile acids in 1 g liver to those in 1 ml serum was increased in hepatic coma due to a decrease in reabsorption of bile acids from the portal vein by the liver and passage of bile acids from the liver into the serum as a result of damage to the membranes of liver cells. Bile secretion is also greatly reduced or abolished and the bile acid pool is reduced in hepatic coma so that the total bile acid content of the liver decreases.

4843 NUMERICAL TAXONOMIC ANALYSIS OF CIRRHOSIS. II. CLINICAL SIGNIFICANCE OF CLASSIFICATIONS. *(E.)* Winkel, P.; Tygstrup, N. (Rigshosp., Copenhagen, Denmark). *Comput. Biomed. Res.* 7(2):17-126, 1974.

4844 NUMERICAL TOXONOMIC ANALYSIS OF CIRRHOSIS. I. THE EFFECT OF VARYING THE NUMBER AND TYPE OF VARIABLES USED. *(E.)* Winkel, P. The Copenhagen Study Group for Liver Diseases. (Rigshosp., Copenhagen, Denmark). *Comput. Biomed. Res.* 7(1):100-110, 1974.

4845 SOCIOECONOMIC AND ALCOHOLIC BEVERAGE CONSUMPTION ASSOCIATIONS WITH LIVER CIRRHOSIS. *(E.)* Monmonier, M. S. (Dept. Georg. Syracuse Univ., N.Y.). *Proc. Pa. Acad. Sci.* 47:39-41, 1973.

4846 RELATION BETWEEN INDIVIDUAL BILE ACIDS IN SERUM AND BILE. *(E.)* Mehta, S. J.; Kaye, M. D.; Struthers, Jr., J. E.; Naylor, J. (Denver VA Hosp., Col.). *Gastroenterology* 66(4):745, 1974.

4847 IMPACT OF UPPER GASTROINTESTINAL BLEEDING ON LIVER FUNCTION IN PATIENTS WITH ALCOHOLIC CIRRHOSIS AND ESOPHAGEAL VARICES. *(E.)* Thomas, E.; Rymer, W.; Rosenthal, W. S. (New York Med. Coll., N.Y.). *Gastroenterology* 66(4):790, 1974.

4848 DETERMINANTS OF THE DERANGED SODIUM HOMEOSTASIS IN DECOMPENSATED CIRRHOSIS. *(E.)* Epstein, M.; Pins, D.; Schneider, N. (no affil.). *J. Clin. Invest.* 53(6):22a-24a, 1974.

4849 CORRELATIONS BETWEEN THE HISTOPATHOLOGICAL DIAGNOSIS OF CIRRHOSIS AND NODULES AND HARDNESS OF THE LIVER OBSERVED DURING LAPAROSCOPY. *(Sp.)* Herrerias, J. M.; Osorio, M.; Moreno, M.; Sanchez-Venegas, S.; Jimenez Pereperez, J.; Damiano Rivero, A. (Univ. Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 42(2):149-154, 1974.

4850 SEROLOGIC AND IMMUNOGLOBULIN ABNORMALITIES IN RELATIVES OF PATIENTS WITH PRIMARY BILIARY CIRRHOSIS. *(E.)* Chura, C. M.; Bias, W.; Boitnott, J. K.; Maimon, H.; Maddrey, W. C. (Johns Hopkins Med. Inst., Baltimore, Md.). *Gastroenterology* 66(4):880, 1974.

4851 NODULAR REGENERATIVE HYPERPLASIA OF THE LIVER IN FELTY'S SYNDROME. *(E.)* Blendis, L. M.; Parkinson, M. C.; Shilkin, K. B.; Williams, R. (Central Middlesex Hosp., London, England). *Q. J. Med.* 43(169):25-32, 1974.

4852 CHARACTERIZATION OF THE ABNORMALITY OF DEOXYCHOLIC ACID METABOLISM IN CIRRHOTIC PATIENTS. *(E.)* Vlahcevic, Z. R.; Yoshida, T.; Swell, L. (VA Hosp., Richmond, Va.). *Gastroenterology* 66(4):897, 1974.

4853 DEFICIENCY OF AN ANTAGONIST TO SERUM INHIBITOR OF LEUKOTAXIS IN CIRRHOTIC PATIENTS. *(E.)* Hughes, W.; Armendariz, M.; Goldman, A. (Univ. Texas Med. Branch, Galveston). *Gastroenterology* 66(4):846, 1974.

4854 A PROSPECTIVE STUDY OF EMERGENCY PORTACAVAL SHUNT FOR BLEEDING ESOPHAGEAL VARICES IN UNSELECTED PATIENTS WITH ALCOHOLIC CIRRHOSIS. *(E.)* Orloff, M. J.; Chandlet, J. G.; Charters, A. C.; Condon, J. K.; Grambort, D. E.; Modafferi, T. R.; Levin, S. E. (Sch. Med., Univ. California, San Diego, La Jolla). *Gastroenterology* 66(4):756, 1974.

4855 PERITONITIS IN THE CIRRHOTIC WITH ASCITES: A DISEASE OF VARIED ETIOLOGIES. *(E.)* Stanley, M. M.; Greenlee, H. B.; McKeever, J. W.; Bedford, D. E. (VA Hosp., Hines, Ill.). *Gastroenterology* 66(4):782, 1974.

4856 ASCITIC FLUID (AF) CELL COUNTS IN "UNCOMPLICATED" CIRRHOTICS: EVIDENCE THAT CELL CONCENTRATIONS INCREASE DURING DIURESIS. *(E.)* Stanley, M. M.; McKeever, J. W.; Bedford, D. E. (VA Hosp., Hines, Ill.). *Gastroenterology* 66(4):782, 1974.

4857 SELECTIVE DECOMPRESSION OF ESOPHAGEAL VARICES BY A CENTRAL SPLENORENAL SHUNT. *(E.)* Belli, L. T.; Forti, D.; Puttini, M. ("Ca Granda" Hosp., Milan, Italy). *J. Cardiovasc. Surg. (Torino)* 15(1):104-113, 1974.

4858 EMERGENCY AND ELECTIVE OPERATIONS FOR BLEEDING ESOPHAGEAL VARICES. *(E.)* Malt, R. A. (Massachusetts Gen. Hosp., Boston). *Surg. Clin. North Am.* 54(3):561-571, 1974.

4859 ALPHA$_1$-ANTITRYPSIN DEFICIENCY AND CHILDHOOD LIVER DISEASE. *(E.)* Burke, J. A.; Blair, J. D.; Kiesel, J. L. (Univ. Kentucky Coll. Med., Lexington). *Gastroenterology* 66(4):669, 1974.

4860 PHARMACOANGIOGRAPHY OF THE LEFT GASTRIC ARTERY IN OESOPHAGEAL VARICES. *(E.)* Lunderquist, A. (Univ. Hosp., Lund, Sweden). *Acta Radiol.* 15(2):157-160, 1974.

See also 4566, 4569, 4717, 4742, 4772, 4775, 4808, 4809, 4812, 4815, 4818.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

4861 CEPHALOTHIN LEVELS IN HUMAN BILE. *(E.)* Ram, M. D.; Watanatittan, S. (Huron Rd. Hosp., Cleveland, Ohio). *Arch. Surg.* 108(2): 187-189, 1974.

Cephalothin sodium levels in serum, gallbladder bile, gallbladder tissue, and common duct bile were studied in 27 patients, 4 of whom were operated on for abdominal conditions other than biliary tract disease, 12 of whom were undergoing cholecystectomy for cholelithiasis or chronic cholecystitis or both, 4 patients with obstructive jaundice, and 7 patients who had a T-tube in their common bile duct following surgery. The first 20 patients above received cephalothin (8 gm, i.v., in 2 gm/6 hr doses). Results indicated that cephalothin is concentrated in bile in normal patients and patients with gallbladder disease. In the presence of jaundice, results are less conclusive. Peak levels in bile were reached 2 hr following a single dose of the drug. The level at 8 hr was less than 1 μg/ml in patients with biliary drainage through a T-tube in the common bile duct. Thus the drug must be given every 4 or 6 hr to maintain adequate concentration in the bile. Since the antibacterial spectrum of cephalothin includes a large number of common biliary pathogens, and since the concentration of the drug in bile reaches levels higher than the minimal inhibitory and even bactericidal concentration in the absence of obstructive jaundice, it may be of use in treating biliary infections.

4862 THE SEQUENTIAL DEPOSITION OF CRYSTALLINE MATERIAL IN GALLSTONES: EVIDENCE FOR CHANGING GALLBLADDER BILE COMPOSITION DURING THE GROWTH OF SOME STONES. *(E.)* Sutor, D. J.; Wooley, S. E. (Dept. Chem., Univ. Coll., London, England). *Gut* 15(2):130-131, 1974.

Determination of the sequential deposition of crystalline compounds in a representative collection of gallstones from 578 patients has been made. Of the 578 stones, 249 were composed entirely of cholesterol or of cholesterol plus the small white beads of calcium palmitate, 77 were entirely calcium salts, 242 contained both cholesterol and calcium salts in varying proportions, and 10 were of amorphous or unidentified material. In 76 of the 207 stones possessing both compounds from which several samples could be taken, the compounds were present in an intimate mixture throughout the stones. In the remaining 131, however, a change in composition occurred during growth. Generally a central nucleus composed of one of these types of compound is surrounded by outer layers formed of a mixture of both, or vice versa. In a few stones there was a change from one type of compound to the other occurring in successive layers. Changes in the number and type of calcium salts precipitated, as well as changes in the crystalline form of calcium carbonate and calcium phosphate, occurred. It is suggested that such changes in gallstone composition may indicate changes in gallbladder bile composition or alterations in the composition of hepatic bile. Loss of gallbladder function could result in the cessation of calcium salt deposition.

4863 THE TREATMENT OF RETAINED STONES IN THE COMMON BILE DUCT WITH SODIUM CHOLATE INFUSION. *(E.)* Lansford, C.; Mehta, S.; Kern, Jr., F. (Univ. Colorado Med. Ctr., Denver). *Gut* 15(1): 48-51, 1974.

Stones were retained in the common bile duct after cholecystectomy and common duct exploration in 6 patients, (4 females and 2 males, aged 19-60 yr). They were treated by sodium cholate infusions through the T-tube. In 4 of the 5 patients in whom the stone or stones were located between the T-tube and the duodenum, treatment was successful within 5 days. In the 5th case, the stone passed after 2 weeks. In 3 of these patients a stone became transiently impacted in the distal bile duct causing a rise in intraductal pressure and pain in the epigastrium and back. Mild, transient pancreatitis developed in 2 cases. Diarrhea occurred in all but was easily controlled with cholestyramine. The one failure was a case in which the stone was located proximal to the tube. In this patient, who was given sodium cholate and sodium deoxycholate, the diarrhea became uncontrollable and treatment was discontinued. Thus it is suggested that infusion of sodium cholate into the common bile duct be used in the treatment of stones retained between the T-tube and the duodenum.

4864 STRATIFICATION OF BILE. *(E.)* Wright, J. T. (Sydney Hosp., Australia). *Aust. Radiol.* 17(2):157-164, 1973.

Stratification in the cholecystogram occurs in most normal people after an all-night fast and before the first meal of the day. It disappears shortly afterwards. It is a normal finding and its transient nature makes it unlikely that it would be a gallstone precursor. Differences observed in the layering phenomenon appear to be due to differences in the times when exposures are made, rather than to differences in contrast media. Although most of the author's observations support the view that stratification is due to inspissated bile, there remain a few cases in which layering occurs with stasis, where excessive inspissation and stone formation would be a possibility. One patient with a history suggestive of cholelithiasis showed marked layering and edge-ring phenomenon in both erect and supine positions on i.v. cholecystography. Since it was feared that gallstones might be concealed in the layer, a 3-day telepaque test was performed and revealed 3 translucent calculi. At cholecystectomy, performed 8 days later, the stones were removed and a high concentration of contrast medium was still present in the gallbladder.

4865 ACUTE NONLITHIASIC CHOLECYSTITIS IN MULTIPLE TRAUMA: A HYPOTHESIS ABOUT ITS ETIOLOGY. THE ROLE OF LYSOLECITHINS. *(Fr.)* Inglesakis, J. A.; Lanfranchi, J. P.; Migliori, G.; Michelangeli, F.; Le Bras, A.; Etienne, A. (St. Roch Hosp., Nice, France). *Nouv. Presse Med.* 3(1):19-21, 1974.

Case reports are presented for 3 patients who developed acute cholecystitis 10-28 days after suffering severe generalized trauma. All 3 patients developed fever, jaundice, and dyskinesia manifested by diffuse abdominal distension and intestinal paresis. Elevated serum alkaline phosphatase activities were found in 2 of the patients. The late onset of cholecystitis is attributed to administration of large doses of antibiotics. At surgery one patient was found to have a subhepatic abscess surrounding a perforated gallbladder. Since 2 of these patients developed fat embolisms, it is suggested that serum lipase, which is activated in this condition, acts on biliary lecithins. The lysolecithins thus liberated might induce lesions in the gallbladder or even the entire biliary tract. Bacteremia and biliary stasis may also play a role.

4866 INFLAMMATORY STENOSIS AT THE JUNCTION OF THE RIGHT AND LEFT HEPATIC DUCTS. *(Fr.)* Roux, M.; Delavierre, P.; Vayre, P.; Hureau, J.; Paolaggi, J.; Levasseur, J.-C. (Vaugirard Hosp., Paris, France). *Sem. Hop. Paris* 49(28):2081-2082, 1973.

A 35-yr-old woman was hospitalized with jaundice which had developed 4 months previously 6 weeks after an episode of severe pain in the right lumbar region which radiated upwards. The patient had been jaundiced at birth and had an unspecified liver disorder as a child. Jaundice was associated with pruritis; hepatomegaly; increased SGOT, SGPT, and serum protein levels; and positive turbidity tests. At surgery the findings included chronic atrophic cholecystitis with no evidence of gallstones and a hard nodule causing stenosis at the junction of the left and right hepatic ducts. Since the nodule was believed to be neoplastic, a hepaticojejunostomy was performed and the patient was given cyclophosphamide before discharge. One yr after surgery the patient became asthenic and developed dyspeptic symptoms, but a radiological examination showed that the anastomosis was functioning perfectly. An enlarged inguinal lymph node which appeared 5 yr after surgery was found to be benign on histological examination. Since more than 5 yr have passed since surgery with no recurrence, it is considered that the patient probably had inflammatory stenosis rather than a carcinoma.

4867 INCREASED BACTERIAL DEGRADATION OF BILE ACIDS IN CHOLECYSTECTOMIZED PATIENTS. *(E.)* Hepner, G. W.; Hofmann, A. F.; Malagelada, J. R.; Szczepanik, P. A.; Klein, P. D. (Mayo Clin., Rochester, Minn.). *Gastroenterology* 66(4):556-564, 1974.

Bile acid metabolism was studied in 12 healthy subjects, 13 patients with cholesterol gallstones, and 10 patients who had undergone cholecystectomy for cholesterol gallstones. Compared with the healthy subjects, the cholecystectomized patients showed significantly increased bacterial deconjugation and 7-dehydroxylation of [2,4-^{3}H]cholyl-[1-^{14}C]glycine. However, the pool of cholylglycine was considerably smaller, so that the absolute rate of deconjugation was similar. The pool of deoxycholylglycine was twice as large as that in the healthy and diseased controls. In addition, ketohydroxy bile acids (resulting from bacterial dehydrogenation) composed 7 to 15% of the bile acid pool. The 7-keto and 12-keto derivatives of cholic acid were identified by mass spectrometry. The total bile acid pool in the cholecystectomized patients did not differ from that in the healthy controls, but it was larger than that in the diseased controls. The size of the total bile acid pool in the cholecystectomized patients correlated closely with the size of the secondary bile acid pool. The apparent return of the total bile acid pool to a normal size after cholecystectomy can be explained in part by the increased input of secondary bile acids from the intestine.

4868 EFFECT OF BILE ACID FEEDING ON CHOLESTEROL METABOLISM IN GALLSTONE PATIENTS. *(E.)* Hoffman, N. E.; Hofmann, A. F.; Thistle, J. L. (Mayo

Grad. Sch. Med., Rochester, Minn.). *Mayo Clin. Proc.* 49(4):236-239, 1974.

An isotope dilution technique was used to determine the exchangeable cholesterol pool and the cholesterol input to the pool in 23 patients with gallstones. Eight were receiving chenodeoxycholic acid (10.0-25.0 mg/kg), 7 cholic acid (7.0-33.0 mg/kg), and 8 a placebo. The patients had been under treatment for at least 6 months prior to the trial, and they remained on their regimen during the 6 months required for measurement of the serum specific activity decay curve. The exchangeable cholesterol pool and cholesterol input were similar in all three groups and the values obtained were nearly identical to those reported by others for patients without gallstones. In a larger group of patients receiving these treatments, the serum cholesterol levels did not change in any of the groups. Triglyceride levels decreased in patients receiving chenodeoxycholic acid, but the magnitude of the change was only about 20%; triglyceride levels remained unchanged in the cholic acid and placebo groups. Thus, p.o. administration of chenodeoxycholic acid does not appear to cause any major change in the body's cholesterol or lipid metabolism while it does decrease cholesterol saturation in the bile and induces gallstone dissolution.

4869 SOME PARAMETERS OF METABOLISM AND NONSPECIFIC IMMUNOLOGICAL REACTIVITY IN CHOLANGITIS IN CHILDREN. *(Rus.)* Gorvits, A. A.; Teplova, S. N. (Cheliabinsk Med. Inst., USSR). *Vopr. Okhr. Materin. Det.* 18(6):37-39, 1973.

4870 EARLY AND LATE COMPLICATIONS OCCURRING AFTER SURGERY ON THE SPHINCTER OF ODDI. *(Ger.)* Lynen, F. K. (Med. Fac., Rhenisch-Westphalian Technical Coll., Aachen, Germany). *Actuelle Chir.* 8(4):243-250, 1973.

4871 BILE ASCITES AND BILE PERITONITIS AFTER HEPATOBILIARY OPERATIONS AND PERFORATIONS OF THE GALLBLADDER AND BILIARY TRACT. *(Ger.)* Ostermeyer, J. (Med. Fac., Rhenisch-Westphalian Technical Coll., Aachen, Germany). *Actuelle Chir.* 8(5):309-314, 1973.

4872 KINETICS OF THE BILIRUBIN LEVEL AFTER SURGERY FOR EXTRAHEPATIC OBSTRUCTION OF THE BILIARY TRACT. *(Ger.)* Roding, H.; Hamann, H. J. (Reg. Hosp., Potsdam, Germany). *Z. Exp. Chir.* 6(3):193-196, 1973.

4873 THERAPEUTIC TRIAL WITH CHENODEOXYCOLIC ACID FOR DISSOLVING CHOLESTEROL GALLSTONES. *(E.)* Beker, S. (Med. Ctr., Caracas, Venezuela). *Gastroenterology* 66(4):664, 1974.

4874 DISSOLUTION OF GALLSTONES BY CHENODEOXYCHOLIC ACID (CDC) AND PHENOBARBITAL (PB). *(E.)* Coyne, M. J.; Bonorris, G. G.; Goldstein, L. I.; Lahana, D. A.; Schoenfield, L. J. (Cedars-Sinai Med. Ctr., Los Angeles, Calif.). *Gastroenterology* 66(4):679, 1974.

4875 ABNORMAL CHOLESTEROL METABOLISM IN PATIENTS WITH CHOLESTEROL CHOLELITHIASIS. *(E.)* Hepner, G. W.; Quarfordt, S. H. (Pennsylvania State Univ. Sch. Med., Hershey). *Gastroenterology* 66(4):710, 1974.

4876 CARCINOMA OF THE GALLBLADDER. A REVIEW OF 158 CASES. *(E.)* Pettersson, H. (Malmo Gen. Hosp., Sweden). *Acta Radiol.* [*Diagn.*] *(Stockh.)* 15(2):225-236, 1974.

4877 HEPARIN AND GALLSTONES. *(E.)* Romero, R.; Butterfield, W. C. (St. Mary's Hosp., Waterbury, Conn.). *Am. J. Surg.* 127(6):687-688, 1974.

4878 PATIENTS WITH HYPERBILIRUBINEMIA AND HYPERAMYLASEMIA: IS THE DIAGNOSIS PANCREATITIS OR BILIARY LITHIASIS? *(E.)* Roth, J. A. (Johns Hopkins Univ. Sch. Med., Baltimore, Md.). *Am. Surg.* 40(6):321-325, 1974.

4879 PAPILLOMA OF THE GALLBLADDER. *(E.)* McGregor, J. C.; Cordiner, J. W. (Stobhill Gen. Hosp., Glasgow, Scotland). *Br. J. Surg.* 61(5):356-358, 1974.

4880 DIFFERING EFFECTS OF PRIMARY BILE ACID INGESTION ON BILIARY LIPID SECRETION IN GALLSTONE PATIENTS: WHY CHENODEOXYCHOLIC ACID BUT NOT CHOLIC ACID DISSOLVES GALLSTONES. *(E.)* LaRusso, N. F.; Hoffman, N. E.; Hofmann, A. F.; Northfield, T. C.; Thistle, J. L. (Mayo Clin., Rochester, Minn.). *Gastroenterology* 66(4):729, 1974.

4881 THE EFFECT OF PHENOBARBITAL ON BILIARY LIPID METABOLISM. *(E.)* Redinger, R. N. (Univ. Hosp., London, Canada). *Gastroenterology* 66(4):763, 1974.

4882 PROMPT RETURN OF BILE TO SUPERSATURATED STATE FOLLOWED BY GALLSTONE RECURRENCE AFTER DISCONTINUANCE OF CHENODEOXYCHOLIC ACID THERAPY. *(E.)* Thistle, J. L.; Yu, P. Y. S.; Hofmann, A. F.; Ott, B. J. (Mayo Clin., Rochester, Minn.). *Gastroenterology* 66(4):789, 1974.

4883 EFFECTS OF MEALS AND FASTING ON BILIARY LIPID OUTPUT AND FREQUENCY OF ENTEROHEPATIC CIRCULATION OF BILE SALTS IN CHOLECYSTECTOMIZED MAN. *(E.)* Wagner, C. I.; Soloway, R. D.; Trotman, B. W.; Rosato, E. F. (Univ. Pennsylvania Hosp., Philadelphia). *Gastroenterology* 66(4):792, 1974.

4884 KINETIC ANALYSIS OF BILIARY LIPID EXCRETION IN MAN AND DOG: AN EXPLANATION FOR MAN'S TENDENCY TO FORM GALLSTONES. *(E.)* Wagner, C. I.; Soloway, R. D.; Trotman, B. W.; Schoenfield, L. J. (Univ. Pennsylvania Hosp., Philadelphia). *Gastroenterology* 66(4):793, 1974.

4885 BILIARY LIPID COMPOSITION AFTER CHOLECYSTECTOMY. *(E.)* Stein, T. A.; Wise, L. (Washington Univ. Sch. Med., St. Louis, Mo.). *Gastroenterology* 66(4):866, 1974.

4886 BILE ACID PATTERN IN GALLSTONE AND CHOLECYSTECTOMIZED PATIENTS RECEIVING CHENODEOXYCHOLIC ACID, AND IN "NORMAL OBESE" PATIENTS. *(E.)* Faloon, W. W.; Rubulis, A.; Hussain, I.; Randhawa, T.; Flood, M. S. (Highland Hosp., Rochester, N.Y.). *Gastroenterology* 66(4):884, 1974.

4887 DISEASED GALLBLADDER IN INDIA. *(E.)* Prakash, A.; Sharma, L. K.; Poddar, P. K. (All-India Inst. Med. Sci., New Delhi). *Int. Surg.* 59(4):214-217, 1974.

4888 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY. A PLEA FOR SELECTIVE USE. *(E.)* Saypol, G. M. (New York Univ. Sch. Med., N.Y.). *J. Am. Med. Assoc.* 228(10):1259-1260, 1974.

4889 LITHOGENIC BILE: A CONSEQUENCE OF WEIGHT REDUCTION. *(E.)* Schreibman, P. H.; Pertsemlidis, D.; Liu, G. C. K.; Aherns, Jr., E. H. (no affil.). *J. Clin. Invest.* 53(6):72a, 1974.

4890 LEIOMYOMA OF THE AMPULLA OF VATER. *(Sp.)* Culebras Fernandez, J. M.; Moreno Gonzalez-Bueno, C. (Jimenez Diaz Fdn., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 42(2):165-172, 1974.

4891 MALIGNANT TRANSFORMATION OF A VILLOUS TUMOR OF THE GALLBLADDER. *(Sp.)* de las Casas Alonso, P.; Mederos, J. R.; Caceres Gomez, F.; Cabezas de Herrera, J. M. (Nuestra Senora de la Candelaria Resident Sanit., Santa Cruz de Tenerife, Canary Islands). *Rev. Esp. Enferm. Apar. Dig.* 42(4):445-450, 1974.

See also 4268, 4274, 4402, 4410, 4442, 4453, 4597, 4632, 4705, 4708, 4739.

GENERAL

4892 TREATMENT OF DIARRHEA IN MALNOURISHED INFANTS AND CHILDREN. A DOUBLE-BLIND STUDY COMPARING AMPICILLIN AND PLACEBO. *(E.)* Garcia de Olarte, D.; Trujillo, H.; Agudelo, N.; Nelson, J. D.; Haltalin, K. C. (Fac. Med., Univ. Antioquia, Medellin, Columbia). *Am. J. Dis. Child.* 127(3): 379-388, 1974.

Rectal swabs and stool specimens for culture were collected from 2,236 infants and children hospitalized for severe diarrhea in Medellin, Colombia, during a 2-yr period. Salmonellae were identified in 280, enteropathogenic *Escherichia coli* in 117, and shigellae in 61 specimens. It was noted that, had only stool specimens been collected, almost half of the pathogens would have been overlooked. Ampicillin or placebo treatment given parenterally or orally for 5 days was offered randomly to 186 patients with enteropathogens and 96 with acute diarrhea of unknown cause. No adverse or beneficial effect of ampicillin was found in infants with enteropathogenic *E. coli*, even though the infecting strains were susceptible *in vitro* to ampicillin. Similarly, no effects were noted in patients with diarrhea of unknown cause. For *Salmonella* infection, orally given ampicillin was equivalent to placebo therapy. However, there was 100% bacteriologic cure without short-term relapse in those given ampicillin intramuscularly. This was a statistically significant difference from placebo or orally given ampicillin treatment. Ampicillin therapy for shigellosis substantially shortened the period of diarrhea, fever and positive stool cultures compared with placebo treatment. The overall mortality among the 282 patients who did not possess other infectious processes in addition to diarrheal disease was 4.3% (12 deaths). Six of the 12 deaths occurred in infants with diarrhea of unknown cause, resulting in a mortality of 6.3% for this group of 96 patients. Mortality among the patients with pathogens was: *shigellae*, 8.1% (3 of 37); *salmonella*, 1.8% (2 of 110); EPEC, 2.9% (1 of 35).

4893 STUDIES ON THE ENTAMOEBA HISTOLYTICA BILE SALT INTERACTION. *(E.)* Gupta, K. G.; Arora, P. K.; Bhalla, V. K. (Dept. Microbiol., Panjab Univ., Chandigarh, India). *Zentralbl. Bakt. Hyg. Orig. A* 225(4):546-552, 1973.

The interaction of *Entamoeba histolytica* with bile salts/acids was studied. The results indicate that some isolates of *E. histolytica* had the capacity to transform cholic to deoxycholic acid in addition to an unidentified metabolite of rf 0.43. Some of the isolate of *E. histolytica* could deconjugate glycholic, glycodeoxycholic and taurodeoxycholic acids with the formation of cholic and deoxycholic acid resp., in addition to some other metabolites. Statistical analysis showed the effect of bile salts on trophozoite formation was not significant. Only deoxycholate on isolate No. 3172 was shown able to impair the cyst formation ability, while other bile salts/acids were insignificant in this respect.

Thus it was concluded that bile salts/acids do not exhibit antiprotozoal effects of significant measure. Although only a small number of patients was examined, it was noted that lithocholic acid was absent in all dysentery patients and present in all normal subjects.

4894 JUVENILE GASTROINTESTINAL POLYPOSIS IN A FEMALE INFANT: REPORT OF A CASE AND REVIEW OF THE LITERATURE OF A RECENTLY RECOGNIZED SYNDROME. *(E.)* Sachatello, C. R.; Hahn, I. S.; Carrington, C. B. (Univ. Kentucky Med. Sch., Lexington). *Surgery* 75(1):107-114, 1974.

A white female infant (age 2 months) was hospitalized for pneumonia. Examination yielded the diagnosis of interventricular septal defect. Multiple polyps were located in both large and small intestine at 5 months of age and a Meckel's diverticulum was removed. At 10 months of age rectal prolapse of multiple polyp-studded mucosa developed and 6 polyps were removed during sigmoidoscopy at this time. Peripheral edema was noted at 1 yr of age. At 14 months a second laparotomy was performed to remove a large gastric polyp and innumerable polyps in the small intestine. A subtotal colectomy was also performed. At 22 months physical examination showed a cachectic child with prominent abdominal distention and rectal prolapse. Cardiomegaly, a loud systolic murmur, clubbing of the fingers, and hepatomegaly were also noted. Multiple polyps were removed from the stomach and the small and large bowel. The patient died in the immediate postoperative period. Based on a review of 7 cases, the composite picture of an infant with juvenile polyposis would be development of diarrhea, either bloody or mucoid, associated with anemia, failure to thrive, and increased susceptibility to pneumonia. Rectal prolapse develops between 8 to 10 months of age. For supportive treatment it is suggested that the diarrhea be treated vigorously with fluid replacement and specific antidiarrheal medication. A broad spectrum of antibiotic agents should be tried along with oral elemental diet preparations to perhaps lessen the roughage content. Prolonged i.v. hyperalimentation may be advantageous. For operative treatment of rectal prolapse, as many rectal polyps as possible should be removed, fulguration is appropriate. For intestinal polyps, recurrent severe blood loss requiring transfusions, persistent diarrhea with weight loss, or signs of partial small bowel obstruction suggest resection of the terminal ileum and colon (usually the most severely involved parts of the gastrointestinal tract). Juvenile polyposis of infancy is characterized by gastrointestinal bleeding, diarrhea, recurrent rectal prolapse, inanition, and intussusception. Prognosis depends on the severity and extent of involvement. Of the 7 infants with extensive juvenile polyposis studied here, 6 died before the age of 2 yr.

4895 LAXATIVE-INDUCED DIARRHOEA: A CONTINUING CLINICAL PROBLEM. *(E.)* Cummings, J. H.; Sladen, G. E.; James, O. F. W.; Sarner, M.; Misiewicz, J. J. (Central Middlesex Hosp., London, England). *Br. Med. J.* 1(5907):537-541, 1974.

Case histories are presented for 7 women, age 26-65 yr, who spent an average of 127 days in the hospital for extensive investigation of abdominal pain, diarrhea, and weight loss due to excessive taking of laxatives. All 7 denied taking laxatives and none displayed the characteristic features of the effects of cathartics on the colon on sigmoidoscopy or radiological examination. Hypokalemia and other electrolyte abnormalities were common and were initially thought to be due to a combination of severe diarrhea and vomiting. Biopsies of the rectal mucosa were abnormal only in 3 patients who had taken senna preparations. In 6 of these 7 patients, one or more of the following abnormalities were found: steatorrhea, low urinary xylose excretion, vitamin B_{12} malabsorption, duodenal ileus, abnormal pancreatic scan, abnormal gastrointestinal hormone assays, and achlorhydria. The diagnosis was not easy and was finally established either by analysis of the urine and stools or by searching the patient's ward locker.

4896 ISOENZYME STUDY ON POSTOPERATIVE TRANSIENT HYPERAMYLASEMIA. *(E.)* Harada, K.; Kitamura, M.; Ikenaga, T. (Toranomon Hosp., Tokyo, Japan). *Am. J. Gastroenterol.* 61(3):212-216, 1974.

Total serum amylase activity levels and isoamylase patterns were studied pre- and postoperatively in 113 patients who underwent various surgical procedures. Similar determinations were simultaneously made of urinary amylase in 19 of these patients. Total serum amylase activity was elevated in the 1st and 2nd postoperative days in 18 patients or 16% of the cases. In all cases serum amylase activity returned to normal between the 2nd and 4th postoperative day without special treatment. None of the patients with hyperamylasemia had clinical symptoms of acute pancreatitis. Good correlations were found between serum and urinary amylase levels. In 12 patients with postoperative hyperamylasemia most of the amylase activity was found in the pre-γ-globulin zone on agar gel electrophoresis. This amylase was therefore considered to be of extrapancreatic origin. In 5 patients with only slightly increased activities and in a 6th patient who underwent pancreaticoduodenectomy for cancer of the ampulla of Vater, most amylase activity was located in the fast-γ-globulin zone. The isoamylase in these cases was interpreted as pancreatic in origin. The mechanisms responsible for transient postoperative hyperamylasemia and the origin of amylase causing the rise are not yet clear. Hence, hyperamylasemia following surgical procedures should not be interpreted as the result, in all instances, of postoperative pancreatitis.

4897 IDIOPATHIC GASTROINTESTINAL BLEEDING AND AORTIC STENOSIS. *(E.)* Cody, M. C.; O'Donovan, P. B.; Hughes, R. W. (Mayo Clin., Rochester, Minn.). *Am. J. Dig. Dis.* 19(5):393-398, 1974.

In a review of the Mayo Clinic patient population from 1964 through 1969, 610 patients with valvular heart disease were sampled. Of these 610, 275 had aortic stenosis, 7 of whom also had idiopathic gastrointestinal bleeding. Patients were excluded

rom the idiopathic category if they had
iaphragmatic hernia, diverticulosis, or a
istory of ulcerogenic drug intake. The control
roup, composed of the remaining 335 patients,
ad no idiopathic gastrointestinal bleeding.
ne prevalence rate for idiopathic gastrointestinal
leeding in patients with aortic stenosis was
.6%, a rate significantly different from that
f the controls. The prevalence rate for idiopathic
astrointestinal bleeding by coded diagnosis for
ne 1967 Mayo Clinic population was 0.025%. This also
nowed a significant increased risk of idiopathic
astrointestinal bleeding in aortic stenosis.
ne number of cases with this association were too
ew to draw valid conclusions concerning the
atural history of these two related conditions.
owever, the most likely explanation appears to be
n intermittent or sustained decrease in mesentery
rtery perfusion, resulting in anoxic damage
nd bleeding in the bowel.

398 THE EFFECT OF R-FACTOR CARRIAGE ON THE SURVIVAL OF Escherichia coli IN THE HUMAN INTESTINE.

(E.) Anderson, J. D.
led. Sch., Univ. Bristol, England). *J. Med.*
icrobiol. 7(1):85-90, 1974.

ne survival of "marked" strains of *Escherichia*
oli with antibiotic-resistance-transfer (R)
actors was studied in the feces of 12 healthy
man volunteers (9 males and 3 females) for 7 days
fter ingestion. Resistance to ampicillin/chlor-
phenicol/kanamycin/streptomycin/sulphonamides
nd to chloramphenicol/streptomycin/sulphonamides/
etracyclines were determined in 14 experiments
n the 12 subjects. Strains without R factors
erved as controls. Chromosomally determined re-
istance markers were used to identify both R-
actor-bearing and R-factor-free strains. In 52
f 54 fecal samples studied, the R-factor-bearing
rganisms were isolated in fewer numbers than the
ontrols. In the 2 samples in which the reverse
ccurred, the effect was not marked. Generally the
all in the number of R-factor-bearing organisms
as progressive, and 4 days after ingestion the
ean fecal population of R-factor-bearing organisms
as only 0.5% of the control organisms. The re-
ative decline in the R-factor population probably
esulted from impaired vitality of organisms bearing
nese plasmids rather than from loss of R factors
rom the cell.

399 GASTROINTESTINAL BLEEDING IN MILD VON WILLEBRAND'S DISEASE.

(E.) Nilsson, L.
; Blomback, M. (Karolinska Inst., Stockholm,
weden). *Rendic. Gastroenterol.* 5(2):90-96, 1973.

n 14 patients from a series of 52 patients with re-
eated melena, no lesion of the gastrointestinal
ract could be demonstrated in spite of very careful
nvestigations. Eight of these patients were sent
or coagulation analyses and in 5 a coagulation de-
iciency was demonstrated. Four were shown to have
mild form of von Willebrand's disease and one an
nknown coagulation disorder. Three other patients,
rom the same clinic, with repeated melena were also
investigated and found to have von Willebrand's disease, mild form. It is stressed that the bleeding history as well as the family history might indicate in which patients with melena of obscure origin a detailed coagulation investigation should be made.

4900 DIFFUSE EOSINOPHILIC GASTROENTERITIS.

(E.) Goldberg, H. I.; O'Kieffe, D.; Jenis, E. H.; Boyce, H. W. (Univ. California Sch. Med., San Francisco). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 119(2):342-351, 1973.

The roentgenographic findings for 4 men (aged 21-28 yr) with diffuse eosinophilic gastroenteritis and 48-69% peripheral blood eosinophils are presented. All patients exhibited extensive duodenal, jejunal, and proximal ileal involvement and in 3 there was concomitant gastric involvement affecting the antrum. Eosinophilic infiltration of the small bowel mucosa and lamina propria, confirmed by autopsy, resulted in regular nodular contour defects consisting of thickened circular folds. More extensive involvement of the bowel or transmural involvement resulted in distorted folds with irregular angulation and a saw-toothed contour of the small bowel; in 1 case the folds were completely effaced, causing narrowing of the bowel lumen. Separation of bowel loops was observed in 3 patients. The roentgenographic evidence of eosinophilic infiltration was completely reversed by systemic steroid therapy (15-40 mg/day prednisone). However, peripheral eosinophil counts remained elevated (10-20%) in 2 patients.

4901 TRANSMISSIBLE GASTROENTERITIS: MECHANISMS RESPONSIBLE FOR DIARRHEA IN AN ACUTE VIRAL ENTERITIS IN PIGLETS.

(E.) Butler, D. G.; Gall, D. G.; Kelly, M. H.; Hamilton, J. R. (Dept. Pediat., Univ. Toronto, Canada). *J. Clin. Invest.* 53(5): 1335-1342, 1974.

Young piglets (3 weeks old) were studied 40 hr after experimental infection with transmissible gastroenteritis virus to identify the mechanisms of diarrhea in this disease and to better understand infectious diarrhea in humans. Using continuous segmental marker perfusions in 4 regions along the gut, significant increases in net intraluminal accumulation of water and electrolytes appeared only in the proximal jejunum, the region infected by the virus. In this jejunal segment studied *in vivo*, unidirectional sodium flux, extracellular fluid to lumen, significantly increased, lumen to extracellular fluid significantly decreased, compared with match-fed littermates. Transmissible gastroenteritis did not alter gross villous structure or intraluminal bacteria, bile salts, lactate, pH, or osmolality. Epithelial cell migration was accelerated in the jejunum of infected pigs. Isolated in suspension, these cells from transmissible gastroenteritis pigs exhibited increased active and passive sodium efflux, cells from mannitol-perfused pigs exhibited only increased active sodium efflux. In this viral enteritis, altered sodium transport in the jejunum, the region of the intestine infected appears to be associated with defective epithelial cell function.

4902 INTESTINAL CANCER IN THE PEUTZ-JEGHERS SYNDROME: A RE-EVALUATION. *(E.)* Reid, J. D.; Petrelli, M. (Cleveland Metropolitan Gen. Hosp., Ohio). *Ohio State Med. J.* 70(4):231-235, 1974.

Among 492 cases of the Peutz-Jeghers syndrome reported through December 1972, 16 (3.2%) have had metastasizing carcinoma and a further 17 (3.4%) have had locally invasive or *in-situ* cancer. Although no increased frequency can be established by statistical analysis, the relatively early age at which cancers have developed, the unusual proportion in the small intestine, and the unusual involvement of both antrum and duodenum in continuity, suggest that there is a small but real addition to the ordinary risk of malignancy. The polyps in the Peutz-Jeghers syndrome are predominantly hamartomas but may contain epithelium with the characteristics seen in ordinary adenomas. Malignant change in polyps has been established but is rare. The practical significance of these findings is that complete disregard for malignant change is unjustified, while overzealous surgical intervention remains unwarranted.

4903 PAROTID GLAND SWELLING DEVELOPING DURING PERORAL ENDOSCOPY. *(E.)* Slaughter, R. L. (VA Hosp., Birmingham, Ala.). *Gastroenterology* 66(4):826, 1974.

4904 LOW pH BEVERAGES AS A POTENTIAL AID IN THE PROPHYLAXIS OF CHOLERA. *(E.)* Anonymous (no affil.). *Israel J. Med. Sci.* 9(11/12): 1594-1598, 1973.

4905 OMPHALOMESENTERIC FISTULA IN THE NEWBORN. *(Sp.)* Rodero, R.; Gonzalez, C.; de la Cruz, G. (Carlos Haya Sanit., Spain). *Rev. Esp. Enferm. Apar. Dig.* 42(5):543-548, 1974.

4906 VASCULAR SYNDROMES OF THE GASTROINTESTINAL TRACT. *(Sp.)* Ibarguen Beitia, S. (no affil.). *Rev. Esp. Enferm. Apar. Dig.* 42(2): 121-130, 1974.

4907 EXTENSIVE LEUKEMIC INFILTRATION OF THE GASTROINTESTINAL TRACT IN CHRONIC LYMPHOSARCOMA CELL LEUKEMIA. *(E.)* Fromke, V. L.; Weber, L. W. (Northwestern Hosp., Minneapolis, Minn.). *Am. J. Med.* 56(6):879-882, 1974.

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4909 IODINE BALANCE STUDIES IN PROTEIN-CALORIE MALNUTRITION. *(E.)* Ingenbleek, Y.; Malvaux, P. (Inst. Clin. Child Nutrition, Univ. Dakar, Senegal). *Arch. Dis. Child.* 49(4):305-309, 1974.

4910 BARIUM SWALLOW STUDY IN HOOKWORM ANAEMIA. *(E.)* Dutta, J. K. (Infectious Dis. Hosp., New Delhi, India). *Delhi Med. J.* 8(3/4):9-11, 1973.

4911 LONG-TERM NUTRITION WITH AN ELEMENTAL DIET FOLLOWING INTENSIVE ABDOMINAL IRRADIATION. REPORT OF A CASE. *(E.)* Haddad, H.; Bounous, G.; Tahan, W. T.; Devroede, G.; Beaudry, R.; Lafond, R. (Gastrointestinal Unit, Univ. Sherbrooke, Canada). *Dis. Colon Rectum* 17(3):373-376, 1974.

4912 CHOLERA EL TOR VIBRIOS AND ATYPICAL FORMS ISOLATED DURING THE OUTBREAK OF CHOLERA IN KENYA IN 1971. *(E.)* Radojcic, V. (World Health Organization, Nairobi, Kenya). *East Afr. Med. J.* 50(12):696-704, 1973.

4913 OXYPERTINE IN THE TREATMENT OF FUNCTIONAL DISORDERS OF THE DIGESTIVE TRACT. *(E.)* Albornoz-Plata, A. (Samaritana Hosp., Bogota, Colombia). *Gastroenterology* 66(4):659, 1974.

4914 IMMUNOGLOBULIN E (IgE) IN HUMAN GUT FLUIDS AND MUCOSAE. *(E.)* Brown, W. R.; Borthistle, B. K.; Chen, T. S. (VA Hosp., Denver, Colo.). *Gastroenterology* 66(4):668, 1974.

4915 GASTRIC CYCLIC AMP ACTIVITY IN ZOLLINGER-ELLISON DISEASE AND PERNICIOUS ANEMIA. *(E.)* Levine, R. A.; Schwartzel, Jr., E. H. (Dept. Med., State Univ. New York, Syracuse). *Gastroenterology* 66(4):730, 1974.

4916 BILE ACID ABNORMALITIES IN UREMIC MAN. *(E.)* Miller, L. J.; Gordon, S. J.; Haeffner, L. J.; Saukkonnen, J. J.; Kinsey, M. D.; Kowlessar, O. D. (Jefferson Med. Coll., Philadelphia, Pa.). *Gastroenterology* 66(4):746, 1974.

4917 THE NATURE AND SIGNIFICANCE OF HYPERAMYLASEMIA FOLLOWING OPERATION. *(E.)* Morrissey, R.; Berk, J. E.; Fridhandler, L.; Pelot, D. (Coll. Med., Univ. California, Irvine). *Gastroenterology* 66(4):751, 1974.

4918 ROLE OF SALICYLATE IN ACUTE UPPER ALIMENTARY BLEEDING. *(E.)* Watson, W. C. (Victoria Hosp., London, Canada). *Gastroenterology* 66(4):795, 1974.

4919 ACUTE INFECTIOUS NONBACTERIAL GASTROENTERITIS: A MISNOMER? *(E.)* Widerlite, L.; Trier, J. S.; Blacklow, N. R.; Schreiber, D. S. (Peter Bent Brigham Hosp., Boston, Mass.). *Gastroenterology* 66(4):799, 1974.

4920 MASSIVE UPPER GASTROINTESTINAL HEMORRHAGE FROM SUPERIOR MESENTERIC ARTERY ANEURYSM

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BLEEDING DIAGNOSED USING THE OLYMPUS JF DUODENOSCOPE. *(E.)* Bonanno, C. A.; Meyers, D. (St. Vincent's Hosp., New York, N.Y.). *Gastroenterology* 66(4):805, 1974.

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4924 INTESTINAL COMPLICATIONS OF NASOJEJUNAL FEEDING IN LOW-BIRTH-WEIGHT INFANTS. *(E.)* Chen, J. W.; Wong, P. W. K. (Abraham Lincoln Sch. Med., Univ. Illinois, Chicago). *J. Pediatr.* 85(1):109-110, 1974.

4925 PNEUMATOSIS CYSTOIDES INTESTINALIS DUE TO BLUNT ABDOMINAL TRAUMA. *(E.)* Shuck, J. M.; Malan, L. J.; Hammar, M. D. (Bernalillo County Med. Ctr., Albuquerque, N.M.). *J. Trauma* 15(5):435-440, 1974.

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4928 SHIGELLOSIS IN CUSTODIAL INSTITUTIONS. III. PROSPECTIVE CLINICAL AND BACTERIOLOGIC SURVEILLANCE OF CHILDREN VACCINATED WITH ORAL ATTENUATED SHIGELLA VACCINES. *(E.)* Levine, M. M.; Gangarosa, E. J.; Werner, M.; Morris, G. K. (Univ. Maryland, Sch. Med., Baltimore, Md.). *J. Pediatr.* 84(6):803-806, 1974.

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4932 SURGICAL MANAGEMENT OF THE ZOLLINGER-ELLISON SYNDROME. *(E.)* Fox, P. S.; Hofmann, J. W.; Wilson, S. D.; DeCosse, J. J. (Med. Coll. Wisconsin, Milwaukee). *Surg. Clin. North Am.* 54(2):395-407, 1974.

4933 ABDOMINAL SURGICAL EMERGENCIES OF THE NEWBORN. *(E.)* Hendren, III, W. H.; Kim, S. H. (Massachusetts Gen. Hosp., Boston). *Surg. Clin. North Am.* 54(3):489-527, 1974.

4934 THE RISE AND FALL OF SHIGA DYSENTERY IN EL SALVADOR, 1969-1973. *(Sp.)* Faich, G. A.; Rivas, E. N.; Gangarosa, E. J. (Public Health Service, El Salvador, San Salvador). *Bol. Of. Sanit. Panam.* 76(4):331-336, 1974.

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4936 THERAPEUTIC PROSPECTS FOR ASSOCIATION OF CHEMICAL ANTIBIOTICS IN BACTERIAL AND PROTOZOAL INFECTIONS OF THE INTESTINE. *(It.)* Buogo, A.; Donno, L. (Clin. Tuberculosis, Univ. Milan, Italy). *Minerva Med.* 65(11):632-635, 1974.

4937 PSYCHOSOMATIC ASPECTS OF DIARRHEA. *(It.)* Antonelli, F.; Servino, V. (Inst. Psychosomatic Med., Univ. Rome, Italy). *Minerva Med.* 65(11):595-604, 1974.

4938 ENDOCRINE DIARRHEA. *(It.)* Benedetti, A. (Reg. Munic. Hosp., Udine, Italy). *Minerva Med.* 65(11):612-613, 1974.

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4942 ENDOSCOPY IN UPPER GASTROINTESTINAL HAEMORRHAGE. *(E.)* McGinn, F. P.; Wilken, B. J. (Southampton Univ. Med. Sch., England). *J. R. Coll. Surg. Edinb.* 19(2):112-115, 1974.

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4944 THE IMMUNOPATHOLOGY OF STOMACH AND INTESTINAL DISEASES. *(Ger.)* Rapp, W. (Med. Clin., Univ. Heidelberg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:797-804, 1972.

4945 EPIDEMIOLOGIC RELATIONSHIPS BETWEEN HUMAN AND ANIMAL SALMONELLA CARRIERS AND THEIR ENVIRONMENT IN THE SWISS REGION OF THE LAKE OF CONSTANCE. *(Ger.)* Pagon, S.; Sonnabend, W.; Krech, U. (Med. Microbiol. Inst., St. Gallen, Switzerland). *Zentralbl. Bakteriol. (Orig.)* 158(5):395-411, 1974.

See also 4390, 4397, 4407, 4420, 4421, 4423, 4428, 4430, 4435, 4440, 4446, 4451, 4459, 4462, 4532, 4545, 4595, 4629, 4667, 4731, 4963.

GENERAL

Parasitology

4946 THE CHANGING PATTERN OF HYDATID DISEASE, WITH SPECIAL REFERENCE TO HYDATID OF THE LIVER. *(E.)* Joske, R. A. (Dept. Med., Univ. Western Australia, Perth). *Med. J. Aust.* 1(5):129-132, 1974.

A survey is presented of 86 patients with hydatid disease who were admitted to 3 teaching hospitals in Australia in the 15 years from 1957-1971. The frequency of admissions did not change significantly during this period. There were 47 males and 39 females. Of the 86 patients, 58 were over 40 yr old and only 10 were below 20. The majority of patients (57) were Australian born; 15 of the 57 were Aboriginals. The most frequent site of infestation was the liver, which was involved in 61 cases and was the sole site in 49 of these. Other intraabdominal hydatids were present in 7 patients, and 3 others had peritoneal hydatids without hepatic disease. The lung was affected in 23 cases, being the only site of disease in 16 cases. Liver and lung were both involved in 6 cases. Other sites such as kidney, brain, and musculoskeletal organs accounted for 7 cases. Hepatic involvement was significantly more common in patients aged over 40 yr, compared with younger patients. There was a significant excess of extra-hepatic hydatids in Australian-born patients compared with immigrants. There were 61 patients with hydatid of the liver, but in 31 this was an incidental finding unrelated to the cause of admission to hospital. The most frequent presentation of the symptomatic patients was liver enlargement (13 cases). Hematological studies showed few significant abnormalities. Radiological examination was of more diagnostic value. The most significant combination of biochemical results was slight elevations in the levels of serum bilirubin and alkaline phosphatase. The continued occurrence and protean manifestation of hydatid disease mean this condition must still be considered in the differential diagnosis of obscure cases, especially with hepatic or pulmonary manifestations, and in elderly patients.

4947 *Schistosoma mansoni* CHEMOPROPHYLAXIS WITH DIETARY LAPACHOL. *(E.)* Austin, F. G. (Natl. Naval Med. Ctr., Bethesda, Md.). *Am. J. Trop. Med. Hyg.* 23(3):412-419, 1974.

4948 HALQUINOL IN COLONIC AMOEBIASIS. *(E.)* Singh, D.; Bhatheja, B. K. (M. G. M. Med. Coll., Indore, India). *Ind. Pract.* 26(10): 489-492, 1973.

See also 4729, 4732, 4770, 4936.

GENERAL

Regional Enteritis

4949 MIXED-LYMPHOCYTE REACTION AS A MEASURE OF IMMUNOLOGICAL COMPETENCE OF LYMPHOCYTES FROM PATIENTS WITH CROHN'S DISEASE. *(E.)* Richens, E. R.; Williams, M. J.; Gough, K. R.; Ancill, R. J. (Dept. Pharmacol., Univ. Bath, England). *Gut* 15(1): 24-28, 1974.

Peripheral blood lymphocytes from 12 patients with Crohn's disease and from a group of normal volunteers have been tested for transformation under stimulation of allogeneic cells in a mixed lymphocyte culture and by phytohaemagglutinin *in vitro*. There was a significant depression of transformation in the mixed lymphocyte culture where lymphocytes from the Crohn's disease patients constituted the responding population. With phytohaemagglutinin stimulation, no difference in transformation was seen between the patients and the control group. This appears to indicate a depression in cellular immunity in Crohn's disease.

4950 GRANULOMATOUS ENTEROCOLITIS IN CHILDHOOD AND ADOLESCENCE. *(E.)* Guttman, F. M. (Jewish Gen. Hosp., Montreal, Canada). *J. Pediatr. Surg.* 9(1):115-121, 1974.

Granulomatous enterocolitis was studied in 52 patients (27 males and 25 females) who had contracted the disease between the ages of 2 1/2 and 19 years. They were followed for 1-24 yr. Early manifestations of the disease, particularly fever of unknown origin and failure to grow, were frequently evident many years before the onset of bowel disease. Abdominal pain was the most frequent symptom. Granulomatous ileocolitis was present in 12 patients, ileitis and jejunitis in 8, and terminal ileitis in 32. Half of those on medical management are doing well. Of 19 patients operated on, 12 did very well and 4 suffered recurrences. Appendectomy after an acute illness was followed by remission in only 3 of 15 patients. Of these 15, 7 required another operation and 4 others had several hospitalizations for recurrent disease. This does not suggest that acute ileitis is a separate entity from chronic granulomatous disease. Of the 6 patients with severe growth retardation, 3 had growth spurts after operation. It is suggested that, although surgery itself does not stimulate growth, it controls the disease for 1-2 yr and thereby allows growth to occur. In a low but meaningful percentage of cases, the surgery provides a long-term respite from symptoms. The operation, which represents an immediate risk to life of 3%, should probably be made more frequently than it currently is in younger patients since much more longlasting results occur in this age group.

4951 EFFECT OF ADMINISTERED HUMAN GROWTH HORMONE ON GROWTH RETARDATION IN INFLAMMATORY BOWEL DISEASE. *(E.)* McCaffery, Jr., T. D.; Nasr, K.; Lawrence, A. M.; Kirsner, J. B. (Louisiana State Univ. Sch. Med., New Orleans). *Am. J. Dig. Dis.* 19(5):411-416, 1974.

In a previous study of 22 severely growth-retarded children with inflammatory bowel disease, endocrinologic evaluation revealed hypogonadism and low growth hormone levels. This was attributed to a secondary hypopituitarism. In order to assess this hypothesis, (2 males, aged 16 and 20 yr), from this group and another 16-yr-old male who was not so severely growth-retarded as to be included in the initial study were given human growth hormone replacement (3 mg 3 times a week) for all 3 patients had no evidence of inflammatory bowel disease for at least 6 months before and during the course of this investigation. No significant height increment could be attributed to the human growth hormone administration, although a definite anabolic response was present in each patient during the trial. It appears that the youngsters with inflammatory bowel disease may have a relative end-organ resistance to the metabolic and growth-promoting effects of human growth hormone and that their growth problems are not related to hypopituitarism.

4952 PNEUMATOSIS COLI IN CROHN'S DISEASE. *(E.)* Ghahremani, G. G.; Port, R. B.; Beachley, M. C. (Univ. Chicago Pritzker Sch. Med., Ill.). *Am. J. Dig. Dis.* 19(4):315-323, 1974.

Two cases of extensive pneumatosis of the colon associated with Crohn's disease are reported. This unusual complication most likely resulted from the intramural dissection of bowel gas due to altered mucosal integrity and increased intraluminal pressure. In these two cases, the submucosal and subserosal collections of gas did not involve the small intestine. The diagnosis of Crohn's disease was established by clinical, radiological, and pathological examinations prior to the development of pneumatosis coli. In the first case, laparotomy was performed when both diseases were in the active phase and displayed their typical features in the resected specimen. In many cases it might be difficult for the pathologist to correctly diagnose and differentiate the two disease processes since their histopathological features (i.e., dilated lymphatic channels and a chronic inflammatory reaction including plasma cells, lymphocytes, eosinophilic leukocytes, giant cells, and granulomas) are similar.

4953 LEUCOCYTE MIGRATION STUDIES IN CROHN'S DISEASE USING CROHN'S COLON HOMOGENATE AND MITOCHONDRIAL AND MICROSOMAL FRACTIONS. *(E.)* Richens, E. R.; Williams, M. J.; Gough, K. R.; Ancill, R. J. (Roy. United Hosp., Bath, England). *Gut* 15(1):19-23, 1974.

Leukocytes from 38 patients (14 males and 23 females, mean age 41 yr) with Crohn's disease were tested for evidence of migration inhibition in the presence of preparations of colon from a patient with this disease. Controls consisted of 12 normal subjects. Abnormal leukocyte migration values were obtained for 18 of 32 patients with crude colonic mucosal homogenate, for 17 of 29 patients with the colonic mitochondrial fraction, and for 22 of 36 patients with the colonic microsomal fraction. No abnormal values were observed in any of the controls. With each antigen tested, significant changes in leukocyte migration occurred only in patients with a clinically active form of the disease and not in those receiving immunosuppressive therapy with prednisone or azathioprine. An additional series of tests with rat liver mitochondria demonstrated that the mitochondrial reaction was organ specific. It is suggested that similar tests should be performed on patients with ulcerative colitis to determine whether the leukocyte migration test could be employed to establish a differential diagnosis between these 2 conditions.

4954 AZATHIOPRINE TREATMENT IN CROHN'S DISEASE. *(E.)* Papp, J. P.; Watson, D. W.; Bull, F. E. (Univ. Michigan Med. Ctr., Ann Arbor). *Am. J. Gastroenterol.* 61(2):136-142, 1974.

After failure to respond to long trials of salicylazosulfapyridine and/or steroids, 6 patients with incapacitating Crohn's disease were treated with azathioprine (2 mg/kg/day p.o.) for 13 to 39 months. These patients consisted of 3 females and 3 males whose age at onset of the disease ranged from 12 to 22 yr. All had histories of Crohn's disease dating back more than 1 1/2 yr prior to azathioprine therapy. Crohn's disease was localized in the small intestine in 2 cases and was present in both the small and large intestine in 4. All patients were below their ideal weights, and 2 had enterocutaneous fistulas. One patient failed to respond and subsequently died of his disease. The other 5 responded during the first year of therapy with weight gain and decreases in diarrhea, pain, and incapacitation. During the 2nd and 3rd yr of treatment, 4 had resurgence of disease activity requiring surgery despite the addition of steroids. One patient had a sustained response with partial healing of fistulas, weight gain, improvement in laboratory values, and return to good health. It is suggested that therapy with azathioprine may have a place in the treatment of patients with extensive Crohn's disease when they no longer respond to the usual medical programs. The response appears to be of several months' duration in most, but is occasionally quite dramatic and prolonged in some.

4955 CROHN'S DISEASE IN SINGAPORE. *(E.)* Lee, S. K. (Dept. Pathol., Singapore). *Med. J. Aust.* 1(8):266-269, 1974.

In a 5-yr period, 6 histologically confirmed cases of Crohn's disease were diagnosed in Singapore. These patients consisted of 4 males and 2 females, aged 39-72 yr (mean 59 yr); all but 1 were permanent residents of Singapore. Of these patients, 4 were Chinese, 1 was a Sikh, and 1 Irish. Since these are probably the only fully documented and proven cases of Crohn's disease in Singapore between 1965 and 1970, the crude incidence for Chinese living in Singapore is estimated to be 0.04/100,000/yr. This rate is very low in comparison with corresponding figures from Western countries. All patients had lesions in both the large and small intestine. The lesions were mainly ulcerative with intervening areas of normal mucosa. Fibrotic strictures were found in 3 specimens; none of them had the "cobblestone" appearance. All but one of the specimens contained granulomas of the sarcoid variety. These granulomas were not present in the regional lymph nodes, which displayed reactive hyperplasia. Transmural inflammation and fissure-ulcers were other features found in histological examinations of the specimens. All patients were asymptomatic with no evidence of recurrence approximately 3 yr after the last case was diagnosed. Although all patients received drug treatment before resection of the involved intestine, none has required medication after surgery.

4956 TREATMENT OF CROHN'S DISEASE WITH AZATHIOPRINE: A CONTROLLED EVALUATION. *(E.)* Klein, M.; Binder, H. J.; Mitchell, M.; Aaronson, R.; Spiro, H. (Yale Univ. Sch. Med., New Haven, Conn.). *Gastroenterology* 66(5):916-922, 1974.

Since Crohn's disease is characterized by spontaneous remissions, a double-blind study was performed to determine whether azathioprine is effective in treating this disease. The 27 patients selected for this study were either unresponsive to other forms of medical management, had intestinal complications that would require extensive resection, or were unable to tolerate steroids because of the severity of their side effects. These patients had histories dating back 18 months to 32 yr. Only 3 patients had normal small intestines, and only 8 had normal colons. These patients were randomized either into a treatment group (3 mg/kg/day azathioprine p.o.) or a placebo group for 4 months. During the subsequent 4-month period, the treatment schedule of the 2 groups was reversed. Except that 4 patients given placebo required surgery during or immediately after the initial 4-month period, no significant difference was found between patients receiving azathioprine and controls. Improvement during azathioprine therapy was dramatic in 6 cases, but no common set of characteristics could be ascertained in these patients which would make it possible to predict in advance those who would benefit from this drug. Although some patients given azathioprine had relapses when they were placed on placebo, other patients who improved on placebo relapsed when they received azathioprine. No evidence was obtained to support the effectiveness of azathioprine in the treatment of Crohn's disease. Immunological investigations revealed that no patients treated with azathioprine demonstrated immunosuppression when appropriately challenged although some patients displayed suppression of their delayed and immediate hypersensitivity systems before drug treatment.

4957 CIRCULATING ANTIBODIES AND LEUCOCYTE MIGRATION INHIBITION TO COLON-ASSOCIATED ANTIGEN IN ULCERATIVE COLITIS AND CROHN'S DISEASE. *(E.)* Marcussen, H.; Bendixen, G. (Rigshosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(2):149-152, 1974.

The occurrence of circulating anticolonic antibodies against mucus-containing cells of the colonic epithelium (as detected by immunofluorescence) and cellular hypersensitivity to fetal colonic or jejunoileal mucosal extract (as detected by leukocyte migration inhibition) was compared in 26 patients with ulcerative colitis, 24 patients with Crohn's disease, and 24 patients with gastrointestinal diseases not known to be associated with bowel inflammation. The presence of circulating anticolonic antibodies was found in 19% of the patients with ulcerative colitis and in 17% of those with Crohn's disease. Inhibition of migration, using colon mucosa extract as the antigen, was found with leukocytes from 23% of the ulcerative colitis patients but with leukocytes from only 13% of the Crohn's disease patients. The apparent difference in degree of inhibition of migration rate of leukocytes from patients with these 2 different diseases was less than that found in previous work but might be explained by circumstantial unavailability of data from certain of the subjects, particularly leukocyte migration inhibition-positive cases. When jejunoileal mucosa extract was used as antigen, the incidence of inhibition of leukocyte migration in ulcerative colitis was 20%; when colon and/or jejunal extract was used, the incidence was 35%. In the patients with gastrointestinal diseases not known to be associated with bowel inflammation, tests for anticolonic antibodies and for inhibition of leukocyte migration were both negative. No case of ulcerative colitis showed co-existing humoral and cellular immunity. This fact, together with the observation that in ulcerative colitis the incidence of humoral antibody was less than that of leukocyte migration inhibition indicated a dissociation of the humoral and cellular immune reations.

4958 USE OF CHEMICALLY DEFINED DIETS IN THE MANAGEMENT OF PATIENTS WITH ACUTE INFLAMMATORY BOWEL DISEASE. *(E.)* Rocchio, M. A.; Cha, C. J. M.; Haas, K. F.; Randall, H. T. (Rhode Island Hosp., Providence). *Am. J. Surg.* 127(4):469-475, 1974.

Forty patients with acute inflammatory bowel disease, including ileocolitis, ulcerative colitis, regional enteritis, granulomatous colitis, diverticulitis, and ulcerative proctitis, were treated with chemically defined, elemental diets. The diets provided a high caloric, high nitrogen substrate with zero residue, and most were virtually fat free. Adherence to a specific protocol permitted administration of 2,000 to 5,000 calories daily for as long as 6 months without significant complication. Four of 6 patients with massive small bowel resection, 1 having only 65 cm of remaining jejunum ending in a jejunostomy, did reasonably well at home. Nitrogen balance studies in 14 of the patients and body composition studies in 7 of the patients confirmed the observation of a marked anabolic response followed by clinical improvement despite extensive gastrointestinal disease. Absorption took place in the upper part of the small bowel with minimal digestion and minimal stimulation of exocrine secretions. The ability to maintain positive nitrogen balance with enteric nutrition is a significant contribution to the treatment of patients with acute and subacute inflammatory bowel disease, obviating surgery in some and significantly reducing the operative risk in others.

4959 THE MEISSNER PLEXUS IN CROHN'S DISEASE OF THE COLON. *(E.)* Siemers, P. T.; Dobbins, III, W. O. (George Washington Univ. Med. Ctr., Washington, D.C.). *Surg. Gynecol. Obstet.* 138(1):39-42, 1974.

A light and electron microscopy study of the Meissner submucosal plexus of normal colon and of colon afflicted with Crohn's disease is presented. Tissue was obtained by rectal punch biopsy or at the time of colectomy from 7 patients with Crohn's disease. Control specimens were taken from the uninvolved margins of surgical resections of 3 patients with carcinoma of the colon and 1 patient with diverticulitis. At light microscopy, parasympathetic ganglion cells of normal colon appeared singly or in ganglia consisting of up to 7 cells and usually could be seen to be encapsulated by a rim of 1 or more thin, spindle-shaped cells. At electron microscopy, the ganglion cell or collection of cells comprising a ganglion was seen to be ensheathed by an outer layer of fibroblasts, the flattened nuclei of which paralled the curvature of the ganglion cell. A distinct, continuous, 100 micron thick basement membrane enclosed the perimeter of the ganglion and adjacent satellite cells. Double blind analysis failed to show significant distinguishing characteristics of normal ganglion cells *versus* those observed in Crohn's disease on the basis of smooth endoplasmic reticulum dilatation, mitochondrial swelling, or neurofilament concentration. Minor changes, such as axon dilatation, increased numbers of neurofilaments, and penetration of nerve fibers by plasma and mast cells were noted, however, in Crohn's disease. Further, centrioles were much more prominent in ganglion cells of Crohn's disease, a finding which supports the hypothesis that ganglion cells may undergo mitosis and explains the hyperplasia of ganglion cells previously documented in inflammatory disease of the intestine.

4960 CROHN'S DISEASE OF THE MOUTH. *(E.)* Fedotin, M. S.; Grimmett, G. M.; Shelburne, J. (Duke Univ. Med. Ctr., Durham, N.C.). *Am. J. Dig. Dis.* 19(4):385-388, 1974.

A case of Crohn's disease involving the mouth is reported. The patient, a 15-year-old white male, entered the hospital with mouth ulcers and bilateral painful masses in the buccal folds which had been present for 6 months. Prior to admission, he noted abdominal discomfort, diarrhea, and lethargy, but no hematochezia, weight loss, or fever. When his bowel symptoms improved, his mouth lesions became much smaller and less tender. An upper gastrointestinal series revealed lesions typical of Crohn's disease. The patient was treated with salicylazosulfapyridine, prednisone, and mouth washes containing hydrocortisone, nystatin, and achromycin. His bowel symptoms improved considerably and his oral lesions became less tender, much smaller, and less indurated. It is imperative that the mouth be carefully examined in every patient with Crohn's disease.

4961 BYPASS COMPARED WITH RESECTION FOR ILEAL CROHN'S DISEASE. *(E.)* Koudahl, G.; Kristensen, M.; Lenz, K. (Rigs Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(2):203-206, 1974.

The postoperative course is described in 15 patients treated with ileal bypass for Crohn's disease localized in the terminal ileum or ileum + cecum. Resection was later required in 10 of the patients since abscesses or fistulas developed in the bypassed bowel (6 cases) or Crohn's disease extended beyond the bypassed segment (4 cases). The cumulative rate of reoperation was lower among 55 patients with Crohn's disease who were treated by primary resection. Steatorrhea occurred frequently after both bypass and resection. The fecal fat excretion seemed to decrease after resection of the blind loop. Vitamin B_{12} malabsorption occurred in 75% of the cases after bypass, as well as after resection. The severity of vitamin B_{12} absorption was not influenced by resection of the blind loop. Abnormal bacterial flora in the duodenum were seen in 1 of 7 patients examined after bypass and in 1 of 9 patients after resection. Resection should always be preferred to a bypass procedure.

4962 LIFE-THREATENING HAEMORRHAGE IN CROHN'S DISEASE. *(E.)* Sunkwa-Mills, H. N. O. (Queen Elizabeth II Hosp., Welwyn Garden City, England). *Br. J. Surg.* 61(4):291-292, 1974.

4963 ISOLATION OF A VIRAL AGENT FROM INTESTINAL TISSUE OF PATIENTS WITH CROHN'S DISEASE AND OTHER INTESTINAL DISORDERS. *(E.)* Aronson, M. D.; Phillips, C. A.; Beeken, W. L. (Univ. Vermont, Burlington). *Gastroenterology* 66(4):661, 1974.

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4966 LONG TERM RESULTS OF COLECTOMY FOR GRANULOMATOUS COLITIS. *(E.)* Fawaz, K.; Dickersin, G. R.; Goldman, H.; Gross, W.; Patterson, J. F.; Glotzer, D. J. (Beth Israel Hosp., Boston, Mass.). *Gastroenterology* 6(4):691, 1974.

4967 ASCORBIC ACID DEFICIENCY AND FISTULA FORMATION IN REGIONAL ENTERITIS. *(E.)* Gerson, C. D.; Fabry, E. (Mt. Sinai Sch. Med., New York). *Gastroenterology* 66(4):698, 1974.

4968 OBJECTIVE AND SUBJECTIVE IMPROVEMENT WITH DRUG TREATMENT IN CROHN'S DISEASE. *(E.)* Goldstein, F.; Thornton, J. J. (Lankenau Hosp., Philadelphia, Pa.). *Gastroenterology* 66(4):702, 1974.

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4970 PERSONALITY TESTING IN SUBJECTS WITH ORGANIC AND FUNCTIONAL BOWEL DISEASE. *(E.)* Watson, W. C.; Roy, J. R. (Victoria Hosp., London, Canada). *Gastroenterology* 66(4):795, 1974.

4971 AZATHIOPRINE IN MANAGEMENT OF CROHN'S DISEASE: A RANDOMIZED CROSS-OVER STUDY. *(E.)* Watson, W. C.; Bukowsky, M. (Dept. Med., Univ. Western Ontario, London, Canada). *Gastroenterology* 66(4):796, 1974.

4972 CROHN'S DISEASE OF THE DUODENUM: WITH SPECIAL REFERENCE TO DUODENOSCOPY. *(E.)* O'Neill, M.; Legge, D.; Whelton, M. J. (St. Finbarr's Hosp., Cork, Ireland). *J. Ir. Med. Assoc.* 67(7):191-192, 1974.

See also 4374, 4383, 4400, 4437, 4458, 4674, 4675, 4676, 4683, 4686.

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GASTROENTEROLOGY

ABSTRACTS AND CITATIONS

NATIONAL INSTITUTE OF ARTHRITIS, METABOLISM, AND DIGESTIVE DISEASES

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1975.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *World Medical Periodicals*, 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	It.	Italian
Ar.	Arabic	Jap.	Japanese
Bul.	Bulgarian	Kor.	Korean
Ch.	Chinese	Latv.	Latvian
Cz.	Czech	Lith.	Lithuanian
Dan.	Danish	Nor.	Norwegian
Dut.	Dutch	Pol.	Polish
E.	English	Por.	Portuguese
Eston.	Estonian	Rum.	Rumanian
Fin.	Finnish	Rus.	Russian
Fl.	Flemish	Ser.	Serbo-Croatian
Fr.	French	Sl.	Slovak
Ger.	German	Sp.	Spanish
Gr.	Greek	Sw.	Swedish
Heb.	Hebrew	Th.	Thai
Hun.	Hungarian	Turk.	Turkish
Ic.	Icelandic	Uk.	Ukrainian
In.	Indonesian	Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	mC,μC	milli-,microcurie(s)
ADP	adenosine diphosphate	mg	milligram(s)
AMP	adenosine monophosphate	min	minute(s)
ATP	adenosine triphosphate	ml	milliliter(s)
BSP	sulfobromophthalein	mm	millimeter(s)
C	degrees centigrade	MTD	maximum tolerated dose
cm	centimeter(s)	ng	nanogram (10^{-9})
CNS	central nervous system	pg	picogram (10^{-12})
cpm	counts per minute	p.o.	orally
DNA	deoxyribonucleic acid	ppm	parts per million
e.g.	for example	r	Roentgen
g	gram(s)	RBC	red blood cells (erythrocytes), red blood count
μg	microgram(s)		
hr	hour(s)	resp.	respectively
i.m.	intramuscular	Rev.	review (only in citations)
i.p.	intraperitoneal	RNA	ribonucleic acid
IU	international unit(s)	s.c.	subcutaneous
i.v.	intravenous	sec	second(s)
kg	kilogram(s)	SGOT	serum glutamic-oxalacetic transaminase
LD$_{50}$	median lethal dose(s)	SGPT	serum glutamic-pyruvic transaminase
LDH	lactic acid dehydrogenase	U	unit(s)
m	meter(s)	UV	ultraviolet
M	molar	WBC	white blood cells (leukocytes), white blood count
mEq	milliequivalent(s)		
mM	millimolar	yr	year(s)
μM	micromolar		

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

4973 FUNCTIONAL CHARACTERISTICS OF SURGICALLY INDUCED JEJUNAL NEOMUCOSA. *(E.)* Binnington, H. B.; Sumner, H.; Lesker, P.; Alpers, A. D.; Ternberg, J. L. (Washington Univ. Sch. Med., St. Louis, Mo.). *Surgery* 75(6):805-810, 1974.

Growth of new jejunal mucosa was induced in 4 dogs by suturing an incised section of proximal duodenum to the serosal surface of the descending colon, leaving a small elliptical area of colon serosa exposed to the jejunal mucosa and lumen. Upon inspection 36 weeks postoperatively, 3 of the dogs had nearly complete coverage of the colon by neomucosa; the 4th had 50-60% coverage. Histological examination revealed that the neomucosa immediately adjacent to the original mucosa had a villous surface pattern, but the villi were generally shorter and blunter than normal. Several brush border enzymes of the neomucosa were assayed: levels of aminopeptidase, maltase, and lactase activities were normal while alkaline phosphatase, sucrase, and trehalase activities were significantly less than in the normal adjacent mucosa. Amino acids were concentrated intracellularly to the same degree by neomucosa and normal mucosa. The neomucosa was sufficiently similar to normal jejunal mucosa to warrant further studies to determine its capacity to digest and absorb food and its possible application in ameliorating severe forms of the short bowel syndrome.

4974 FOCAL AVILLOUS LESIONS IN THE GUINEA-PIG DUODENUM INDUCED BY FASTING. *(E.)* Poulsen, S. S. (Univ. Copenhagen, Denmark). *Acta Pathol. Microbiol. Scand. (A)* 82(2):264-276, 1974.

The stomach and small intestine of 63 male guinea pigs that fasted for varying lengths of time were studied in the stereomicroscope and by conventional histological methods after periodic acid-Schiff (PAS) staining. The animals fasted for 0 (control), 12, or 18 hr and for 1, 2, 3, 4, 5, 7, or 9 days. There were no lesions in the 9 controls. In less than 24 hr, fasted animals showed superficial mucosal lesions in the duodenum, where they were most pronounced, and decreased in extent toward the proximal jejunum; more distally, no mucosal changes occurred. Within the first days they increased in extent and intensity with the duration of fasting. In some areas, the changes manifested themselves as sharply demarcated lesions in which the villi were enclosed by PAS-negative material and in which the villous structure was partially obliterated. In other areas, the central morphology was similar, but in the periphery of the lesions the apical part of all villi had been desquamated, the surface consisting merely of transverse ridges representing the common base of the villi. In addition, there were large, sharply demarcated areas in which the apices of the villi were absent throughout. Specific histological changes were as follows: no changes in some of the 12 hr and 9 day fasted animals; detachment of villi through the 5th day, with peak number at 1 day; avillous areas at 18 hr and through the entire 9 days, with high numbers at days 1-5; villi regeneration in 7 and 9 day fasted guinea pigs. The pathological reaction of avillous surface areas occurring in the guinea-pig duodenum and proximal jejunum after brief fasting may be observed also in man, elicited locally when the pH in the small intestine falls below a certain level as in patients with the Zollinger-Ellison syndrome or with duodenal ulcer.

4975 ON THE FINE STRUCTURE OF THE GALLBLADDER AND BILIARY DUCTS: V. HISTOCHEMICAL LOCALIZATION OF MUCOSUBSTANCES IN THE HUMAN GALLBLADDER EPITHELIUM. *(Ger.)* Luciano, L.; Reale, E.; Wolpers, C. (Med. Coll., Hannover, Germany). *Histochemistry* 38(1):57-70, 1974.

Cell structure and mucin synthesis and secretion were studied in gallbladders from 3 patients with cholesterosis. Small areas with no pathological changes were selected for examination. A modification of the periodic acid-Schiff (PAS) reaction was used to stain glycogen and glycoproteins, while the Alcian blue method (pH 1.2) was used to detect acid mucins. Electron microscope studies were made of thin sections stained with the periodic acid-thiocarbohydrazide (PA-TCH)-silver proteinate reaction for glycogen and glycoproteins and with the colloidal iron method for acid mucins. When examined under the light microscope, the Golgi complex gave a positive reaction only with the PAS reaction, but granules in the Golgi complex and immediately below the microvilli, together with mucins in the microvilli, gave positive reactions with both the PAS and Alcian blue methods. After drastic methylation the Alcian blue reaction became negative, suggesting that the mucins are acid (sulfated) glycoproteins. When thin sections were stained with the PA-TCH-silver proteinate method and examined under the electron microscope, silver particles were found primarily in transitional vesicles of the gallbladder epithelium and in the Golgi complex and secretion granules. The maturing surface of the Golgi complex and secretion granules reacted with colloidal iron. The contents of vesicles and tubules in the apical part of chief cells gave positive reactions with both the PA-TCH-silver proteinate and colloidal iron methods. These structures may either be involved in regeneration of the antennulae microvilares or may represent the remnants of secretion granules which have emptied through tubular processes onto the free cell surface. It remains to be seen whether mucin secreted in cholesterosis is the same as that in the normal gallbladder or whether it results from a pathological process.

4976 EPITHELIAL CELL PROLIFERATION DURING ORGANOGENESIS OF RAT COLON. *(E.)* Eastwood, G. L.; Trier, J. S. (Boston Univ. Sch. Med., Mass.). *Anat. Rec.* 179(3):303-310, 1974.

Between the 16th and 20th day of gestation, the mucosa of the colon of fetal Sprague-Dawley albino rats changed from a simple tube with a tiny lumen lined by stratified epithelium to a much more complex structure with a large lumen and well-developed crypts lined by a single layer of columnar epithelium. The number of fetal epithelial cells seen proliferating after exposure to 250 μCi ^{3}H-thymidine (i.v. into tail vein of the mother) was high during the period of organogenesis but decreased rapidly after the 20th day of gestation once the adult mucosal pattern had formed. This pattern as shown by autoradiography revealed that fetal cell proliferation was present throughout the stratified epithelium but was confined to the lower half of the colonic crypts immediately on their formation. Neonates aged 1, 10, and 20 days were also studied; and after i.p. 1.5 μCi ^{3}H-thymidine/g, autoradiographic examination showed that cell proliferation, which had sharply decreased 1-2 days before birth, remained at that lesser level up to 20 days. Thus, results indicate that between 6 days before and 2 days after birth, the colonic mucosa changes from a simple primitive stratified epithelium with very active but randomly oriented cell proliferation to a highly organized mucosa whose structure and epithelial cell proliferative pattern closely resemble that of the adult colon.

4977 CELL REGENERATION OF HUMAN GASTRIC MUCOSA. AUTORADIOGRAPHIC IN VITRO EXAMINATIONS OF GASTRIC MUCOSA BIOPSIES.

(Ger.) Castrup, H. J.; Fuchs, K.; Schiller, U. (Clin. Polyclin. Gen. Surg., Gottingen Univ., Germany). *Res. Exp. Med.* 161(4):311-320, 1973.

In vitro studies of cell proliferation were performed on gastric mucosal biopsies from male Wistar rats and male and female patients with no evidence of stomach disease. Biopsies were incubated for 2 hr in homologous (pH 7.9-8.0) and autologous plasma (pH 6.4-7.9), resp., at 37 C in an atmosphere of pure oxygen (3.2-3.5 atm). All experiments were performed between 9 and 11 a.m. Determination of the rate of ^{3}H-thymidine incorporation and the ^{3}H-labeling index in gastric mucosa from the rat showed that no decrease occurred in the rate of DNA synthesis or the number of cells synthesizing DNA under the experimental conditions employed. The mean labeling index was the same *in vitro* and *in vivo* in the rat. Autoradiographic measurements made on incubated biopsies from human gastric mucosa revealed that the mean labeling index was 10.0 ± 0.7% and the mean mitotic index, 0.8 ± 0.2%. By means of the double labeling technique, the mean duration of DNA synthesis was found to be 7.0 ± 0.6 hr, the mean generation time 71 ± 8 hr, the duration of mitosis 0.6 ± 0.1 hr, and the minimal duration of the G_2 phase, 1-2 hr. The maximal duration of the G_1 phase was calculated to be approximately 61-62 hr. With the exception of the mean generation time, which is significantly longer in man, all of these values agree well with literature values obtained *in vivo* on experiemtal animals.

4978 EFFECTS OF SOME HYPOCHOLESTEROLEMIC AGENTS ON HEPATIC ULTRA-STRUCTURE AND MICROBODY ENZYMES.

(E.) Hruban, Z.; Mochizuki, Y.; Gotoh, M.; Slesers, A.; Chou, S. F. (Dept. Pathol., Univ. Chicago, Ill.). *Lab. Invest.* 30(4): 474-485, 1974.

The effects of several drugs on body weight, plasma cholesterol, fine structure of the liver, and activities of selected hepatic microbody enzymes was investigated in Sprague-Dawley male rats fed the drugs for 6 weeks. Four groups of drugs were studied. The first group included cyclizine and its derivatives, namely, chlorcyclizine, homochlorcyclizine HCl, norchlorcyclizine, hydroxyzine HCl, and meclizine HCl; the second group, compounds affecting blood cholesterol levels, namely, 1-benzylimidazole, boxidine HCl, haloperidol, and W-1372 (N-(benzyloxy)-N-(3-phenylpropyl)-acetamide); the third, antihistaminics, including carbinoxamine maleate, chlorpheniramine maleate, chlorphenoxamine HCl, diphenhydramine HCl, tripelennamine HCl, and promethazine HCl; the fourth, a compound inhibiting formation of steroids, namely, aminoglutethimide. Each compound, mixed with Purina laboratory chow, was fed *ad libitum*. Controls received chow alone. All drugs except aminoglutethimide and W-1372 inhibited body weight gain to varying degrees. Chlorcyclizine, homochlorcyclizine, norchlorcyclizine, meclizine, 1-benzylimidazole, boxidine, and haloperidol decreased plasma cholesterol markedly. The highest catalase activity was found in liver homogenates of rats treated with 1-benzylimidazole. Highest activities of urate oxidase and of D-amino acid oxidase were found in livers of rats treated with W-1372, while aminoglutethimide reduced the activities of both these enzymes. Principle alterations in the fine structure of the hepatocytes occurred in the endoplasmic reticulum, lipid, and microbodies. Feeding of chlorcyclizine, 1-benzylimidazoline, and W-1372 was associated with hepatomegaly, alteration of rough endoplasmic reticulum, proliferation of smooth endoplasmic reticulum, accumulation of neutral lipid droplets, appearance of liposomes, proliferation of microbodies in hepatocytes, and increase in activity of the 3 microbody enzymes. Liver cells of W-1372-treated rats showed accumulation of a loose filamentous network at the membranes. This change may indicate a new cytopathologic process and is called topolysis. Perilipidic cisternae are induced by many drugs, excluding W-1372, and are believed to have a role in lipid metabolism. Hypocholesterolemia induced by boxidine and haloperidol was not associated with changes in microbodies and microbody enzymes. Ultrastructural changes induced by the various anthihistaminics showed no common pattern.

4979 OBSERVATIONS ON THE FINE STRUCTURE AND PEROXIDASE CYTOCHEMISTRY OF NORMAL RAT LIVER KUPFFER CELLS.

(E.) Wisse, E. (Lab. Electron Microscopy, Leiden, Netherlands). *J. Ultrastruct. Res.* 46(3):393-426, 1974.

An electron microscope investigation of sinusoidal lining cells in rat liver revealed that Kupffer cells have a variable but often stellate shape and a surface fuzzy coat which is visible after direct osmium fixation. Worm-like structures were restricted to

Kupffer cells, as were the annulate lamellae. The dense bodies varied in shape, diameter, and density. Kupffer cells may rest on or be inserted in, but are not continuous with, the fenestrated endothelial lining. No gaps were observed between Kupffer cells and endothelial cells. These morphological features make it possible to distinguish the Kupffer cells from other sinusoidal lining cells. The Kupffer cells did not contain droplets, glycogen particles, autophagic vacuoles, or multivesicular bodies. Only the Kupffer cells displayed a positive reaction for peroxidase in the nuclear envelope, the rough endoplasmic reticulum, and annulate lamellae after fixation for 40 sec and incubation by either perfusion or immersion. This specific staining reaction makes it possible to recognize Kupffer cells under the light microscope. Time-series incubation of Vibratome sections showed that the peroxidase reaction in Kupffer cells is sensitive to the method of fixation, H_2O_2, pH 9.0, 2×10^{-2} M AT, 10^{-2} M NaN_3, boiling, and the omission of *p*-dimethylaminoazobenzene (DAB) or H_2O_2 from the medium. No significant retardation of the reaction occurred in the presence of 10^{-2} M KCN. It is concluded that a peroxidase rather than a catalase is responsible for the reaction with DAB.

4980 MORPHOLOGICAL DIFFERENCES AMONG GASTRIC PARIETAL CELLS. *(E.)* Helander, H. F. (Dept. Anat., Univ. Umea, Sweden). *Acta Hepato-gastroenterol.* 21(1):84, 1974.

4981 EXTRANUCLEOLAR PYRONINOPHILIC SUBSTANCES IN THE LIVER CELL NUCLEI OF STARVE-REFED MICE AS REVEALED BY NONAQUEOUS NEGATIVE STAINING. *(E.)* Miyawaki, H. (Aichi Cancer Ctr., Nagoya, Japan). *J. Ultrastruct. Res.* 47(2):255-271, 1974.

4982 EFFECT OF CHOLESTYRAMINE ON TAUROCHOLATE INDUCED INJURY TO MOUSE GASTRIC MUCOSA. *(E.)* Eastwood, G. L. (U.S. Naval Hosp., Philadelphia, Pa.). *Gastroenterology* 66(4):687, 1974.

4983 ISOLATION AND IDENTIFICATION OF GASTRIN CONTAINING GRANULES IN VITRO. *(E.)* Dretler, R.; Roth, S. I.; James, J. H.; Fischer, J. E. (Harvard Med. Sch., Boston, Mass.). *Gastroenterology* 66(4):687, 1974.

4984 DIFFERENTIATION AND MATURATION OF CULTURED FETAL SMALL INTESTINE. *(E.)* DeRitis, G.; Trier, J. S.; Falchuk, Z. M. (Peter Bent Brigham Hosp., Boston, Mass.). *Gastroenterology* 66(4):683, 1974.

4985 DISTRIBUTION OF S-CELLS IN THE UPPER G.I. TRACT AND ITS BIOLOGICAL SIGNIFICANCE. *(E.)* Chey, W. Y.; Escoffery, R.; Hendricks, J. (Genesee Hosp., Rochester, N.Y.). *Gastroenterology* 66(4):675, 1974.

4986 DIRECT EFFECTS OF ENDOTOXIN ON CANINE GASTRIC MUCOSAL PERMEABILITY AND HISTOLOGICAL CHANGES. *(E.)* Cheung, L.; Stephenson, L. W.; Moody, F. G.; Torma, M. J.; Zalewsky, C. (Dept. Surg., Univ. Utah, Salt Lake City). *Gastroenterology* 66(4):674, 1974.

4987 EFFECTS OF CHENODEOXYCHOLIC AND LITHOCHOLIC ACIDS ON HAMSTER LIVER ULTRASTRUCTURE. *(E.)* Borowsky, S. A.; Bonorris, G. G.; Goldstein, L. I.; Schoenfield, L. J. (Wadsworth VA Hosp., Los Angeles, Calif.). *Gastroenterology* 66(4):668, 1974.

4988 DEGENERATION OF NORADRENERGIC NERVE TERMINALS IN SUBMUCOUS GANGLIA OF THE RAT DUODENUM FOLLOWING TREATMENT WITH 6-HYDROXYDOPAMINE. *(E.)* Wong, W. C.; Helme, R. D.; Smith, G. C. (Dept. Anatomy, Univ. Singapore). *Experientia* 30(3):282-284, 1974.

4989 THE RELATIVE BIOLOGICAL EFFECTIVENESS OF CYCLOTRON FAST NEUTRONS FOR EARLY AND LATE DAMAGE TO THE SMALL INTESTINE OF THE MOUSE. *(E.)* Geraci, J. P.; Jackson, K. L.; Christensen, G. M.; Parker, R. G.; Fox, M. S.; Thrower, P. D. (Dept. Radiol., Univ. Washington, Seattle). *Eur. J. Cancer* 10(2):99-102, 1974.

4990 CONTINUOUS LABELLING STUDIES ON MOUSE SKIN AND INTESTINE. *(E.)* Potten, C. S.; Kovacs, L.; Hamilton, E. (Christie Hosp., Manchester, England). *Cell Tissue Kinet.* 7(3):271-283, 1974.

4991 SCANNING ELECTRON MICROSCOPY OF THE HUMAN GASTRIC MUCOSA; FETAL, NORMAL AND VARIOUS PATHOLOGICAL CONDITIONS. *(E.)* Takagi, T.; Takebayashi, S.; Tokuyasu, K.; Tsuji, K. (Med. Sch., Nagasaki Univ., Japan). *Acta Pathol. Jap.* 24(2):233-247, 1974.

4992 IN VIVO AND IN VITRO BEHAVIOR OF ENDOCRINE CELLS IN ISOLATED GASTRIC POUCHES IN THE RABBIT. *(Fr.)* Lefranc, G.; L'Hermite, A.; Prandal, G.; Andre, J.; Tusques, J. (Fac. Med., Nantes, France). *C. R. Assoc. Anat.* 57(156):111-122, 1973.

4993 DIFFERENTIATION OF THE INTERHEPATOCYTIC JUNCTIONS IN MICE DURING THE FETAL PERIOD. *(Fr.)* Perissel, B.; Malet, P.; Pourhadi, R. (Fac. Med., Clermont-Ferrand, France). *C. R. Assoc. Anat.* 58(157):397-406, 1973.

4994 SYNTHESIS OF α-FETOPROTEIN AND ALBUMIN IN THE DEVELOPING MOUSE LIVER: CELL-FREE STUDIES. *(E.)* Tamaoki, T.; Koga, K.; Thomas, K.; Schindler, I. (Univ. Alberta Cancer Res. Unit., Edmonton, Canada). *Fed. Proc.* 53(5):pt II, 1523, 1974.

4995 CALCIUM-DEPENDENT CONTROL OF THE MITOCHONDRIAL OXIDATION-REDUCTION STATE IN INTACT HEPATOCYTES. *(E.)* Ontko, J. A.; Otto, D. A. (Oklahoma Med. Res. Fdn., Oklahoma City). *Fed. Proc.* 53(5): pt II, 1523, 1974.

4996 A MORPHOLOGICAL AND PHARMACOLOGICAL STUDY OF THE PARIETAL CELLS OF THE STOMACH IN THE DOG DURING PERIODS OF MAXIMAL ACID OUTPUT AND AFTER THE GASTRIC SECRETORY INHIBITOR UK-9040. *(E.)* Hamer, D. B.; Price, A. B.; Baron, J. H. (Royal Postgrad. Med. Sch., London, England). *Gut* 15(4):336-337, 1974.

See also, 4975, 5019, 5096, 5101, 5181, 5232, 5279, 5280, 5294, 5301.

ABSORPTION—EXCRETION—TRANSPORT

4997 AMINO ACID ABSORPTION AND INCORPORATION AFTER HYPOPHYSECTOMY. *(E.)* Levitan, R.; Havivi, E.; Poppe, L.; Coleman, D. (VA West Side Hosp., Chicago, Ill.) *Am. J. Dig. Dis.* 19(6):525-532, 1974.

The effects of hypophysectomy on the intestinal uptake of ^{14}C labeled amino acids (0.5 µC) and on their incorporation into the small intestine were studied *in vitro* and *in vivo* in male albino rats of the CD strain (1 month old). Incubated segments of the small intestine from hypophysectomized rats fed *ad libitum* absorbed L-glycine at a higher initial rate and, ultimately, to a greater extent than segments from control animals when measured in a time-course experiment 5 days following surgery. The enhanced uptake due to hypophysectomy was observed with amino acid concentrations up to 20 mM for both L-glycine and L-leucine and was essentially maximal at concentrations of 10-15 mM. Five days after surgery, the absorption of L-leucine and that fraction of absorbed leucine present in the cell sap of the tissue rose from approximately 62% in the sham-operated control intestinal segments to 85% in the tissue of the hypophysectomized groups. Similar results were obtained with L-glycine, DL-methionine, and DL-ornithine during this early, postsurgical period. Four to five days following ablation, L-leucine uptake became significantly less than the essentially unchanged value seen in the sham-operated controls. In general, reduced incorporation of the labeled amino acids into protein was obtained both *in vivo* in isolated intestinal loops and *in vitro*. Weight gained by sham-operated rats exceeded that gained by hypophysectomized rats in the pair-fed group. These findings show a divergent response to hypophysectomy as regards amino acid uptake by rat intestine, an enhanced uptake 4-5 days following surgery and a depressed uptake subsequently.

4998 TRANSDUCTAL FLUXES OF ANIONS IN THE RAT PANCREAS. *(E.)* Mangos, J. A.; McSherry, N. R.; Nousia-Arvanitakis, S.; Schilling, R. F.; Wagner, V. (Univ. Wisconsin Med. Sch., Madison). *Proc. Soc. Med. Exp. Biol.* 146(1):321-328, 1974.

The effect of i.v. secretin (0.5 units/min) on the transductal fluxes of anions were studied in the pancreas of male, albino Sprague-Dawley rats. The stimulation of pancreatic secretion with pilocarpine was performed by injecting the drug i.v. (0.2 mg/100 g). During stimulation of the rat pancreas with secretin, the Cl^- concentrations in the pancreatic juice were elevated at high flow rates approaching those found in the acinar fluid of the gland. With decreasing flow rates toward prestimulation levels, a gradual decrease in the Cl^- concentrations to approximately 70.0 mEq/liter was observed. The change in the HCO_3^- concentrations were in the opposite direction to those of Cl^-. During stimulation of rat pancreatic secretion with pilocarpine, the Cl^- concentration in the pancreatic juice did not change with changes in the flow rates and remained at the mean level of approximately 120.0 mEq/liter, identical to the concentrations of Cl^- found in the acinar fluid during this form of secretory stimulation. Similarly, HCO_3 concentrations remained at the level of approximately 29.0 mEq/liter, again identical to acinar fluid concentrations. During i.v. stimulation of the rat pancreas with cholecystokinin-pancreozymin (0.3 units/min), there were no net transductal fluxes of anions, and the anionic composition of the final pancreatic juice was identical to that of the primary fluid secreted by the gland. The results show that transductal fluxes of anions against concentration gradients occur in the duct system of the rat pancreas during stimulation of secretion with exogenous secretin injected i.v. These fluxes cannot be demonstrated in the unstimulated and in the cholecystokinin-pancreozymin or pilocarpine stimulated pancreas.

4999 INFLUENCE OF VASOPRESSIN AND TOPICAL BILE SALTS ON THE GASTRIC MUCOSAL BARRIER OF THE SUBHUMAN PRIMATE. *(E.)* Ritchie, W. P., Jr. (Walter Reed Army Inst. Res., Washington, D.C.). *Surgery* 75(6):853-860, 1974.

The effect of mucosal ischemia alone and in combination with topically applied bile salts on the gastric mucosal barrier properties was studied in 4 rhesus monkeys (*Macaca mulatta*). The animals were prepared with internally drained, vagally denervated fundic pouches. Each pouch was cannulated and exposed first to acid test solution alone (80 mM HCl, 80 mM NaCl, 2 g/liter polyethylene glycol) and then to acid test solution containing 10 mM sodium taurocholate. Electrical potential difference was continuously monitored, and the net fluxes of H_2O, H^+, and Na^+ were assessed at 15-minute intervals with acid test solution and acid test solution plus sodium taurocholate (10mM) during the continuous intra-arterial infusion of 0.9% NaCl into the celiac axis and during the infusion of the celiac axis with vasopressin, (0.05 U/kg/min). With acid test solution alone, mucosal ischemia markedly reduced net Na^+ and H_2O flux and significantly impaired the ability of the mucosa to maintain electrical gradients, findings more consistent with inhibition of active transport processes and contraction of the extracellular space than with alterations in mucosal permeability. With taurocholate acid test solution, mucosal ischemia did not further alter the potential difference *versus* acid test solution alone and did not increase net H^+ flux *versus* the non-ischemic mucosa. It is concluded that in the subhuman primate, ischemia *per se* does not significantly affect gastric mucosa permeability and does not significantly enhance permeability changes induced by the topical application of 10mM sodium taurocholate.

5000 STUDIES ON ACTIVE ABSORPTION OF VITAMIN B_{12} BY ISOLATED RAT ENTEROCYTES. *(Fr.)*

Carrera, G.; Mitjavila, S.; Derache, R. (Res. Group Toxicol. Foods, Beverages, INSERM, Toulouse, France). *Biol. Gastroenterol. (Paris)* 7(1):43-51, 1974.

Isolated cells were prepared from rat ileum by treatment with physiological saline containing 2.5 mM ethylenediamine tetraacetic acid (EDTA) for 25 min at 7 C. After washing several times with Krebs-Ringer bicarbonate (pH 7.7) to remove the EDTA, calcium was added to the medium and cells were resuspended in Krebs-Ringer bicarbonate containing 1% glucose. Vitamin B_{12} absorption in these cells was measured by incubating them in a Warburg apparatus at 37 C in the presence of ^{57}Co-labeled vitamin B_{12} and rat gastric juice containing active or thermally inactivated intrinsic factor. In the absence of intrinsic factor vitamin B_{12} absorption was not eliminated but amounted to almost 60% of that occurring in the presence of active gastric juice. This phenomenon is attributed to passive binding of the vitamin. Active absorption, which occurred in the presence of intrinsic factor, was significantly inhibited by the addition of ouabian (2 mM/liter), phloridizine (1 and 2 mM/liter), and 2,4-dinitrophenol (1 mM/liter) to the medium. Although passive binding of vitamin B_{12} increased in a dose-dependent fashion when ethanol (5 and 10 g/liter) was added to the medium, ethanol significantly decreased active vitamin B_{12} absorption. Ethanol may favor penetration of the vitamin into membrane lipoprotein, thus increasing passive binding. The decrease in active vitamin B_{12} absorption suggests that ethanol interferes with enzyme systems responsible for active transport of vitamin B_{12}.

5001 SUCROSE AND HYPERLIPIDAEMIA. II. THE RELATIONSHIP BETWEEN THE RATES OF DIGESTION AND ABSORPTION OF DIFFERENT CARBOHYDRATES AND THEIR EFFECTS ON ENZYMES OF TISSUE LIPOGENESIS.

(E.) Naismith, D. J.; Rana, I. A. (Dept. Nutr., Queen Elizabeth Coll., London, England). *Nutr. Metab.* 16(5):285-294, 1974.

Weanling Sprague-Dawley rats were fed, for 50 days, diets containing starch, sucrose, maltose, fructose or glucose. No differences were found among the different groups in the rates of growth or in food intakes. The concentration of triglycerides in the plasma was raised by more than 50% when the dietary carbohydrate was presented in the form of monosaccharides or disaccharides. When compared with the effects of the high-starch diet, diets containing the sugars promoted a substantial, and similar, rise in plasma lipids. Hepatic lipogenesis was increased by all the sugars, sucrose and maltose having an equal effect. Lipogenesis in adipose tissue was, however, depressed by feeding sucrose or fructose. Diets containing sucrose, maltose or fructose stimulated a significant rise in concentration of cholesterol in the plasma. In rats fed sucrose or maltose, the activity of pyruvate kinase was doubled when compared with the value for rats fed starch. Fructose induced a 4-fold increase, whereas glucose had least effect. The sugars were digested and absorbed much more rapidly than was starch. The hyperlipidemic effect of sucrose can be explained primarily on the basis of its rapid rate of hydrolysis and absorption, and any differences existing between the metabolism of glucose and fructose are of secondary importance.

5002 EFFECT OF FREE AND CONJUGATED BILE ACIDS ON NET WATER, ELECTROLYTE, AND GLUCOSE MOVEMENT IN THE PERFUSED HUMAN ILEUM. *(E.)*

Krag, E.; Phillips, S. F. (Mayo Clin. Fdn., Rochester, Minn.). *J. Lab. Clin. Med.* 83(6):947-956, 1974.

Perfusion studies were performed in 8 healthy volunteer subjects (21 to 45 yr) to test whether the secretory effect of bile acids, previously shown for the colon and the jejunum, was present in the ileum. A perfusion system with a proximal occlusive balloon (and aspiration of upper intestinal secretions) was used; isotonic test solutions contained bile acids. Fluid movement was measured by changes in the concentration of polyethylene glycol. The following bile acids were used: glycochenodeoxycholic acid, glycodeoxycholic acid, chenodeoxycholic acid, deoxycholic acid, glycolic acid, and cholic acid. Free and glycine-conjugated dihydroxy compounds and free trihydroxy bile acid inhibited net fluid and electrolyte absorption and, at higher concentrations, evoked secretion of water and electrolytes. The free dihydroxy bile acids were especially potent. The conjugated trihydroxy bile acid glycocholic acid had no effect on ileal absorption. Glucose absorption continued despite fluid secretion, but its rate decreased during perfusion with free dihydroxy bile acids. As much as 70% of perfused bile acids were absorbed from the ileum. Water movement was closely correlated to the net movements of sodium, potassium, chloride, and bicarbonate. When water was absorbed, electrolytes were absorbed, and when fluid was secreted, all ions were secreted. Minor degrees of abdominal cramps, vomiting, and diarrhea were noted by 3 subjects during perfusion of glycochenodeoxycholic or chenodeoxycholic acid. These symptoms may be related to an effect of unabsorbed bile acids entering the colon where they can induce water secretion and diarrhea. The results indicate that physiologic concentrations of dihydroxy bile acids influence salt and water transport in the human ileum. It is proposed that this effect of bile acids may influence the consistency of ileal contents postprandially.

5003 ACTIVE AND PASSIVE BILE ACID ABSORPTION IN MAN. PERFUSION STUDIES OF THE ILEUM AND JEJUNUM. *(E.)* Krag, E.; Phillips, S. F. (Mayo Clin., Fdn., Rochester, Minn.). *J. Clin. Invest.* 33(6):1686-1694, 1974.

Absorption of the major human bile acids was investigated in 12 healthy volunteers by steady state perfusion of the distal ileum in 112 studies and of the proximal jejunum in 48. Use of a randomized order of 4 different bile acid perfusions on 1 day of study and also up to 4 consecutive days in a subject allowed important comparisons of data from the same individual. Chenodeoxycholic acid was absorbed faster than glycochenodeoxycholic acid in the ileum. At most concentrations, the passive component of chenodeoxycholic acid absorption was quantitatively important in the ileum; whereas for glycochenodeoxycholic acid, the active component predominated. Taurocholate had the highest apparent maximal transport velocity in the ileum and was absorbed more rapidly than glycochenodeoxycholate. In the jejunum, passive permeability to bile acids was twice that of the ileum, and the permeabilities to free and glycine-conjugated chenodeoxycholate were in the same ratio as in the ileum (9:1). Jejunal permeability to chenodeoxycholic acid was 3 times that of cholic acid. Variation of intraluminal pH by up to 1.4 units did not influence jejunal uptake of free bile acids. These results provide a basis for estimation of intestinal reabsorption of bile acids in intact man.

5004 INTESTINAL FRUCTOSE ABSORPTION IN ETHANOL-TREATED RATS. *(It.)* Ghirardi, P.; Marzo, A.; Grassetti, S. (Inst. Biol. Chem., Univ. Milan, Italy). *Boll. Soc. Ital. Biol. Sper.* 49(11):629-632, 1973.

Fructose absorption was measured in the small intestine of Sprague-Dawley rats fed *ad libitum* and given 4 g/kg/day ethanol, p.o. through a stomach tube, for 2, 7, and 20 days. Untreated rats served as controls. Experiments were performed after a 5 hr fast in controls and 5 hr after the last dose of ethanol in treated rats. At laparotomy, 5 ml of a 20% fructose solution (1 g) was placed in the small intestine which was ligated at the top of the duodenum and at the ileocecal valve. After 1 hr the solution was removed and fructose was determined photometrically by the 3-indolacetic acid reaction. In contrast to glucose absorption, which was reduced in previous experiments on ethanol-treated rats, ethanol had no effect on fructose absorption. This is attributed to the passive, rather than active, absorption of fructose due to its lack of an alcoholic hydroxyl group on C2 in both the pyranose and furanose forms.

5005 EVIDENCE FOR ACTIVE TRANSPORT OF THE DIPEPTIDE CARNOSINE (β-ALANYL-L-HISTIDINE) BY HAMSTER JEJUNUM IN VITRO. *(E.)* Matthews, D. M.; Addison, J. M.; Burston, D. (Westminster Med. Sch., London, England) *Clin. Sci. Mol. Med.* 46(6):693-705, 1974.

The characteristics of intestinal transport and hydrolysis of carnosine (β-alanyl-L-histidine) were studied in rings of everted hamster jejunum *in vitro.* During incubation with carnosine, large amounts of intact peptide appeared in the intestinal wall, accompanied by small amounts of the constituent free amino acids. Although there was some extracellular hydrolysis, these amino acids were almost entirely derived from intracellular hydrolysis of the peptide. Incubation in L-alanyl-L-histidine resulted in uptake of the constituent free amino acids without the appearance of intact peptide in the intestinal wall. Total uptake of β-alanine (both peptide-bound and free) and total uptake of histidine were greater from a low concentration (1 μM/ml) of carnosine than uptake of these amino acids from the equivalent amino acid mixture. At a high concentration of carnosine (10 μM/ml), total uptake of β-alanine was greater from the peptide than from the equivalent amino acid mixture, but total uptake of histidine was less. At this concentration, total uptake of β-alanine plus total uptake of histidine from the peptide was approximately the same as from the amino acid mixture. Uptake of carnosine by jejunal rings was the result of a saturable process. Intact carnosine was concentrated in the intestinal wall, the concentration ratio between intracellular fluid and incubation medium being up to 3.4/1. Uptake of carnosine was reduced by anoxia, metabolic inhibitors, and replacement of medium Na^+. The data suggest that Na^+-dependent active transport is involved in the uptake of carnosine by hamster jejunum *in vitro.*

5006 HEREDITARY FRUCTOSE INTOLERANCE. ANIMAL MODEL: SUSTAINED INTRAPORTAL INFUSION OF RATS WITH FRUCTOSE. *(E.)* Phillips, M. J.; Yu, D. T.; Burch, H. B. (Dept. Pathol., Univ. Toronto, Canada). *Am. J. Pathol.* 75(3):591-594, 1974.

An experimental model for use in the study of hereditary fructose intolerance in man is described and discussed. Since fructose administration to rats, either i.v. or i.p., results in hepatic retention of metabolites, especially fructose-1-phosphate, and a transient drop in hepatic ATP levels, this procedure was followed here in male Wistar rats. Continuous infusion of concentrated (40% and 10%) fructose solution *via* mesenteric vein catheter did induce sustained accumulation of fructose-1-phosphate and marked reduction in ATP. The rapid phosphorylation of fructose tied up the available ATP and phosphate ions, setting the stage for degradation of adenine nucleotides, one of these being inosine monophosphate which inhibits aldolase B. Therefore, secondarily there was further accumulation of fructose-1-phosphate. Concomitant with these biochemical changes, alterations in cellular structure occurred: hyaloplasmic rarefaction, segmental degranulation of rough endoplasmic reticulum with formation of pleomorphic membranous whorls, nodular aggregation of smooth endoplasmic reticulum, and simplification and decrease in size of the Golgi apparatus. Under similar experimental conditions, rats infused with other hexoses showed no such lesions and no alterations in hepatic ATP and fructose-1-phosphate levels. As seen here, sustained fructose loading in rats induces acute hepatocellular lesions that are the morphologic and biochemical counterparts of those seen in hereditary fructose intolerance in man. Therefore, this experimental model can be used to study the pathogenesis and biochemical pathology of hepatic subcellular lesions in this disorder.

5007 IN VIVO CALCIUM TRANSPORT BY RAT SMALL INTESTINE AFTER MASSIVE SMALL BOWEL RESECTION.

(E.) Urban, E.; Pena, M. (Univ. Texas Med. Sch., San Antonio). *Am. J. Physiol.* 226(6):1304-1308, 1974.

Because long-term survival and well-being after extensive small bowel resection largely depend on the absorptive capacity of the remaining intestine, this study was designed to investigate adaptation of calcium transport in the small intestine after such surgery in male albino Sprague-Dawley rats. Segments of 50 cm were excised from either the proximal or distal small bowel and the cut ends sutured together to maintain continuity of the lumen. After 6-7 weeks, calcium transport changes were assesed *in vivo* on the basis of: (1) mucosal transport specific activity (lumen-to-plasma flux and absorption/g dry mucosa); and (2) segment transport capacity (lumen-to-plasma flux and absorption/cm segment length). Calcium was supplied by a 2 ml/min perfusion of ligated 10 cm segments of duodenum, midgut and ileum for 2 hr with 10 ml of recycled solutions containing 3.4 mM ^{40}calcium as calcium chloride and approximately 0.2 μC/ml of tracer ^{45}calcium. Proximal resection resulted in significant mucosal growth in all three segments: (A) duodenal transport specific activity decreased, but mucosal mass increased; therefore segment transport capacity remained unchanged; (B) midgut transport specific activity increased and mucosal mass increased maximally; hence segment transport capacity more than doubled; and (C) ileal transport specific activity remained unchanged; thus segment transport capacity mirrored the increased mucosal mass. Distal resection resulted in no mucosal growth in all 3 segments: (A) duodenal transport specific activity fell, hence segment transport capacity decreased; (B) the midgut showed no change in either transport specific activity or segment transport capacity; and (C) ileal transport specific activity increased and segment transport capacity rose correspondingly. One most striking finding was that the maximal adaptation of segment transport capacity occurred in the midgut after proximal resection. Another striking result was the decrease in duodenal mucosal transport specific activity after each type of resection compensated by mucosal growth only after proximal excision. In man, previous investigations found that the segment distal to the duodenum was more sensitive to factors controlling calcium absorption under normal physiological conditions. Perhaps the same holds true under the abnormal conditions after massive intestinal resection. In general, the mechanisms by which calcium transport adaptations occurred in these findings remain to be defined.

5008 INTESTINAL ABSORPTION OF PROSTAGLANDIN $F_{2\alpha}$, 15(S)-15-METHYL PROSTAGLANDIN $F_{2\alpha}$ AND THEIR METHYL ESTERS IN THE DOG.

(E.) Robert, A.; Magee, W. E.; Miller, O. V.; Nezamis, J. E. (Upjohn Co., Kalamazoo, Mich.). *Biochim. Biophys. Acta* 348(2):269-278, 1974.

Radioactive prostaglandins were introduced *in vivo* into the lumen of intact jejunal loops of male mongrel dogs; and venous blood, collected from the segments at 5 min intervals for a 60 min period, was analyzed for absorbed drugs and metabolites. At least 10^7 cpm of each radioactive compound was used for each dog in a total of 2.0 mg. (A) Absorption of [9-^{3}H]-Prostaglandin $F_{2\alpha}$: After administration of this compound or its methyl ester, from 8-18% of initial radioactivity accumulated in the blood in 60 min. However, both compounds were extensively metabolized in the intestinal mucosa: (1) less than 0.3% of the administered dose of prostaglandin $F_{2\alpha}$ was recovered from the blood as the intact compound; and (2) following administration of the methyl ester, up to 1.7% of the dose was found in the blood as unesterified prostaglandin $F_{2\alpha}$. (B) Absorption of 15(S)-15-methyl-prostaglandin $F_{2\alpha}$: A methyl group at carbon-15 of the prostaglandin molecule slowed down intestinal absorption considerably. Thus, when this methylated compound was given, from 0.8-1.2% of the radioactivity of the administered dose accumulated in the blood. For the more readily absorbed methyl ester, 2.4-4.7% radioactivity reached the blood. In both cases, 25-50% of plasma radioactivity appeared as free acid (blood levels of 0.3-4.2% of the dose). Because of mucosal and plasma esterase activity, very little ester appeared in the blood. Since a methyl group at carbon-15 blocks the action of prostaglandin dehydrogenase without preventing other degradative reactions, intestinal administration of 15(S)-15-methylprostaglandin $F_{2\alpha}$ results in appreciable blood levels of the intact compound. Thus, the 15(S) compounds, which are more active than the parent prostaglandins in antifertility tests and as gastric antisecretory agents, offer an opportunity to evaluate intestinal absorption more readily. Increasing the lipophilicity of the compounds by esterification of the carboxyl group also affects the intestinal absorption.

5009 REVERSED NET WATER FLUX IN FROG GASTRIC MUCOSA IN THE ABSENCE OF AN APPLIED OSMOTIC GRADIENT. *(E.)* Villegas, L.; Sananes, L. (Biophys., Biochem. Ctr., Venezuelan Inst. Sci. Invest., Caracas). *Am. J. Physiol.* 226(6):1338-1343, 1974.

Results of studies on the influence of serosal and mucosal extracellular compartments of gastric mucosa on water movement and the effects of solution viscosity on the net water and ionic fluxes are presented here. Gastric mucosa stripped from the excised stomach of *Rana pipiens* was tested for the effects of dextran (10 mM) on the net water flux, potential difference, net ion transport, acid secretion, and conductance. The viscosity of these dextran solutions measured 4.7 times greater than that of the nutrient solution alone and that of water. Dextran simultaneously applied at the serosal and mucosal surfaces inhibited the net water flux, reduced the net ion transport and secretion by 27%, and reduced the conductance by 38%. Applied at the mucosal surface only, dextran produced no changes in net water flux, net ionic transport and secretion, and conductance. When dextran was used on the serosal surface only, there was a reversal of net water flux, a reduction by 17% of ionic transport and secretion, and reduction of conductance by 29%. It is believed that the effects on water filtration and ionic conductance (when the viscosity of solutions is increased by 4.7 upon the addition of dextran) must change the composition of the serosal extracellular space content. Therefore, the effect of this change in composition on the net water flux is considered as evidence of the role of the extracellular space in regulating the net volume flux.

5010 THE INFLUENCE OF BLOOD FLOW ON THE PHLORIZINE-INSENSITIVE AND SENSITIVE GALACTOSE ABSORPTION IN RAT JEJUNUM. *(E.)* Lichtenstein, B.; Winne, D. (Pharmacol. Inst., Univ. Tubingen, Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 282(2):195-212, 1974.

Jejunal loops of anesthetized male Wistar rats were perfused with buffered solutions (pH 6.8) containing D-galactose in 2 concentrations: below (100 μM) and above (100 mM) blood sugar concentration. At constant intermediate blood flow, the appearance rate and disappearance rate decreased with time. A decrease of the blood flow rate from about 1.9 to about 0.3 ml/min/g diminished both appearance and disappearance rates. Increasing the blood flow from about 0.3 to about 1.0 ml/min/g did not increase the absorption rates. In fact, a slight decrease was noted. In the presence of phlorizin (2 mM) the absorption rates and the tissue accumulation of galactose were reduced. At constant intermediate blood flow, the appearance and disappearance rate increased with time. A decrease of the blood flow rate from about 1.8 to about 0.3 ml/min/g diminished the appearance rate. An increase in blood flow rate from 0.3 to 1.8 ml/min/g increased the appearance rate in contrast to the experiments without phlorizin. Therefore, the different blood flow dependence of the intestinal absorption observed with actively transported substances can be attributed to their nonpassive component.

5011 REVERSAL OF COLONIC NET ABSORPTION TO NET SECRETION WITH INCREASED INTRALUMINAL PRESSURE. *(E.)* Bury, K. D.; Mc Clure, R. L.; Wright H. K. (Yale Univ. Sch. Med., New Haven, Conn.). *Arch. Surg.* 108(6):854-857, 1974.

In Wistar strain rats, the intraluminal pressure of 10 cm colonic loops was raised by *in vivo* perfusion from control levels of 4 cm saline to experimental levels of 30 cm for 1 hr in order to measure effects on net water, sodium, and unidirectional sodium movement. Nonabsorbable polyethylene glycol (1%) was used as a water marker, while ^{24}sodium (5 μC/liter) measured sodium movement; both were perfused with saline. The equilibration period of 1 hr showed absorption of both water (0.34 ml/cm/hr) and sodium (44.9 Eq/cm/hr). With increase of intraluminal pressure to over 30 cm saline, a rapid reversal of both water and salt from net absorption to net secretion was seen at 15 min with continued rise in secretion over 1 hr, even though intracolonic pressure was kept stable. Increased movement of sodium from blood to lumen was the main cause for the observed net secretion. It is suggested that an increased intraluminal pressure is transmitted across the mucosa, causing an increase in mucosal interstitial pressure with a diffusion of isotonic saline into the lumen in response to this gradient. However, upon release of the intraluminal pressure although recovery was progressive, net secretion of both sodium and water was still present after 45 min. Unidirectional sodium movement during the control period demonstrated bidirectional movement of sodium, with lumen-to-blood movement exceeding blood-to-lumen With increased intraluminal, pressure, insorption dropped while exsorption increased. At all times, there was a significant correlation between water and sodium movement, and net movement whether absorption or secretion was isotonic. This series of events can best be explained by a concept of mainly active transport of sodium from lumen to blood while movement in the reverse direction is a filtration or diffusion phenomenon dependent on the creation of osmotic gradients. This study particularly underline the magnitude of fluid loss that can be caused by significant increases in intracolonic pressure and emphasizes that this loss continues for some time after the relief of the obstruction. The fluid shift is isotonic and similar in electrolyte composition to plasma. Results here also point out the danger in delay of relief of obstruction as the alteration in fluid dynamics is a progressive one, and recovery of function is probably much slower in cases of obstruction.

5012 PROTEIN DIGESTION AND ABSORPTION IN THE RAT. *(E.)* Curtis, K. J.; Kim, Y. S. (VA Hosp., San Francisco, Calif.). *Gastroenterology* 66(4):680, 1974.

5013 GLUCOSE ABSORPTION BY ISOLATED RAT INTESTINE EXPOSED TO LIGHT OR PERMANENT DARKNESS *(Fr.)* Sadeghi-Louyeh, A. (Fac. Med., Univ. Teheran, Iran). *C. R. Soc. Biol. (Paris)* 167(12):1834-1836, 1974.

5014 RATE-LIMITING STEP FOR LYMPHATIC TRANSPORT OF LUMINAL TRIGLYCERIDE BY PROXIMAL VERSUS DISTAL RAT INTESTINE IN VIVO. *(E.)* Clark, S. B.; Wu, A.-L.; Holt, P. R. (St. Luke's Hosp. Ctr., New York, N.Y.). *Gastroenterology* 66(4):676, 1974.

5015 EXPERIMENTS ON THE ORAL ADMINISTRATION OF LARGE AMOUNTS OF FATS. *(Ger.)* Kasper, H.; Fleischer, K.; Rommelt, W.; Flasshoff, H. J. (Med. Clin., Univ. Wurzburg, Germany). *Tijdschr. Gastroenterol.* 16(2):139-147, 1973.

5016 CALCIUM TRANSPORT IN ISOLATED RAT HEPATOCYTES. *(E.)* Kleineke, J.; Stratman, F. W. (Inst. Enzyme Res., Univ. Wisconsin, Madison). *FEBS Lett.* 43(1):75-80, 1974.

5017 ACTIVE TRANSPORT OF L-ASCORBIC ACID IN THE HUMAN ILEUM. *(E.)* Stevenson, N. R. (Rutgers Med. Sch., Piscataway, N.J.). *Gastroenterology* 66(4):784, 1974.

5018 THE ANTRAL "BARRIER". *(E.)* Spenny, J. G.; Flemstron, G.; Shoemaker, R. L.; Sachs, G. (VA Hosp., Brimingham, Ala.). *Gastroenterology* 66(4):781, 1974.

5019 ENTERIC MICROBIOL EFFECTS ON JEJUNAL CARBOHYDRATE TRANSPORT, DISACCHARIDASE ACTIVITY, BILE SALTS AND ULTRASTRUCTURE. *(E.)* Lifshitz, F.; Wapnir, R. A.; Wehman, H. J.; Hawkins, R. L.; Pergolizzi, R. (North Shore Univ. Hosp., Manhasset, New York). *Gastroenterology* 66(4):731, 1974.

5020 COLONIC MUCOSAL ADRENERGIC RECEPTORS FOR ELECTROLYTE FLUXES. *(E.)* Gurll, N. (Walter Reed Army Inst. Res., Washington, D.C.). *Gastroenterology* 66(4):705, 1974.

5021 SITE OF SMALL INTESTINAL CALCIUM ABSORPTION IN MAN. *(E.)* Greenwald, A. J.; Schedl, H. P. (Univ. Iowa Coll. Med., Iowa City). *Gastroenterology* 66(4):704, 1974.

5022 ION TRANSPORT AND EFFECTS OF SALICYLATE AND BILE SALT ON ISOLATED ANTRAL MUCOSA. *(E.)* Fromm, D.; Schwartz, J. H. (Harvard Med. Sch., Boston, Mass.). *Gastroenterology* 66(4):695, 1974.

5023 ENDOTOXIN-COMPLEMENT DISRUPTION OF THE GASTRIC MUCOSAL BARRIER. *(E.)* Fischer, R. P.; Medina, F.; Peter, E. T. (VA Hosp., Albuquerque, N.M.). *Gastroenterology* 66(4):692, 1974.

5024 A PROPOSED MECHANISM FOR COPPER AND ZINC ABSORPTION IN THE RAT. *(E.)* Evans, G. W.; Votava, H. J.; Sandstead, H. H. (U. S. Dept. Agriculture, Grand Forks, N.D.). *Gastroenterology* 66(4):689, 1974.

5025 EFFECT OF ETHANOL ON INTESTINAL ABSORPTION OF THEOPHYLLINE. *(E.)* Koysooko, R.; Levy, G. (no affil.). *J. Pharm. Sci.* 63(6):829-833, 1974.

5026 THE BLIND LOOP SYNDROME IN GERMFREE ANIMALS: STUDIES OF B_{12} ABSORPTION. *(E.)* Arnold, G. A.; Hines, D. P.; Nance, F. C. (Louisiana State Univ. Sch. Med., New Orleans). *Gastroenterology* 66(4):661, 1974.

5027 CONJUGATED BILE ACIDS IN THE CANINE GALLBLADDER: EFFECT ON WATER ABSORPTION IN THE ABSENCE AND PRESENCE OF LECITHIN. *(E.)* Ammon, H. V. (Med. Coll. Wisconsin, Milwaukee). *Gastroenterology* 66(4):660, 1974.

5028 TRIPEPTIDE ABSORPTION IN HUMAN INTESTINE: EVIDENCE FOR A COMMON CARRIER FOR DI- AND TRI-PEPTIDE TRANSPORT. *(E.)* Adibi, S.; Morse, E.; Masilamani, S.; Amin, P. (Montefiore Hosp., Pittsburgh, Pa.). *Gastroenterology* 66(4):657, 1974.

5029 EFFECT OF ETHANOL ON ION TRANSPORT IN THE DOG STOMACH. *(E.)* Kuo, Y. J.; Sernka, T. J.; Gilleland, C. W.; Shanbour, L. L. (Univ. Texas Med. Sch., Houston). *Fed. Proc.* 33(5, pt. II):1214, 1974.

5030 THE TRANSPORT OF SOME SELECTED NEUTRAL AMINO ACIDS IN CHICKEN SMALL INTESTINE. *(E.)* Miller, D. S. (Univ. Maine, Orono). *Diss. Abs. Int.* 34(12)B:5867, 1974.

5031 EFFECT OF CHOLERA TOXIN ON PHOSPHORYLATION AND KINASE ACTIVITY OF INTESTINAL EPITHELIAL CELLS AND THEIR BRUSH BORDERS. *(E.)* Wells, S. (Univ. Oklahoma, Oklahoma City). *Diss. Abs. Int.* 34(11)B:5324, 1974.

5032 EFFECT OF POLYMORPHISM ON THE DISSOLUTION BEHAVIOR AND GASTROINTESTINAL ABSORPTION OF CHLORTETRACYCLINE HYDROCHLORIDE. *(E.)* Miyazaki, S.; Arita, T.; Hori, R.; Ito, K. (Fac. Pharm. Sci., Hokkaido Univ., Japan). *Chem. Pharm. Bull. (Tokyo)* 22(3):638-642, 1974.

5033 DIGESTION AND ABSORPTION OF STARCH, MALTOSE AND LACTOSE BY THE PRERUMINANT CALF. *(E.)* Coombe, N. B.; Smith, R. H. (Natl. Inst. Res. Dairying, Reading, England). *Br. J. Nutr.* 31(2):227-235, 1974.

5034 DAILY RHYTHMIC CHANGE OF L-HISTIDINE AND GLUCOSE ABSORPTION IN RAT SMALL INTESTINE ......

IN VIVO. *(E.)* Furuya, S.; Yugari, Y. (Natl. Inst. Animal Ind., Chiba, Japan). *Biochim. Biophys. Acta* 343:558-564, 1974.

5035 INTESTINAL OXALATE ABSORPTION. *(E.)* Binder, H. J. (Yale Univ., New Haven, Conn.). *Gastroenterology* 66(4):667, 1974.

5036 EFFECTS OF ETHANOL ON POSSIBLE TRANSPORT MECHANISMS OF THE GASTRIC MUCOSA. *(E.)* Tague, L. L.; Shanbour, L. L. (Univ. Texas Med. Sch., Houston). *Gastroenterology* 66(4):787, 1974.

5037 THE pH-DEPENDENT EFFECT OF SODIUM TAUROCHOLATE ON INCREASING GASTRIC MUCOSAL PERMEABILITY. *(E.)* Birkett, D.; Silen, W. (Harvard Med. Sch., Boston, Mass.). *Gut* 15(4):336, 1974.

5038 FUNCTIONAL DIFFERENTIATION OF THE HUMAN JEJUNUM AND ILEUM. *(E.)* Silk, D. B. A.; Webb, J. P. W.; Lane, A. E.; Clark, M. L.; Dawson, A. M. (St. Bartholomew's Hosp., London, England). *Gut* 15(4):339-340, 1974.

5039 EFFECT OF GAMMA RADIATION ON INTESTINAL ABSORPTION OF SULFANILAMIDE. *(E.)* Hayton, W. L. (Coll. Pharm., Washington State Univ., Pullman) *J. Pharm. Sci.* 63(4):645-646,1974.

5040 STUDIES ON THE INTESTINAL ABSORPTION OF OROTIC ACID IN NEWBORNS. *(Ger.)* Hinkel, G. K.; Le Petit, G. (Carl Gustav Carus Med. Acad., Dresden, Germany). *Paediatr. Grenzgeb.* 12(1):63-69, 1973.

5041 TRANSEPITHELIAL IONIC TRANSPORT AND ELECTRICAL POLARIZATION IN THE LARGE BOWEL. *(E.)* Rask-Madsen, J. (Glostrup Hosp., Denmark). *Scand. J. Gastroenterol.* 9(3):223-229, 1974.

5042 INFLUENCE OF DIETARY FACTORS ON THE GASTROINTESTINAL ABSORPTION OF LEAD. *(E.)* Garber, B. T.; Wei, E. (Univ. California, Sch. Pub. Health, Berkeley). *Toxicol. Appl. Pharmacol.* 27(3): 685-691, 1974.

See also, 5081, 5288, 5303, 5354.

MOTILITY

5043 DIFFERENTIAL RESPONSES OF THE CANINE GASTRIC CORPUS AND ANTRUM TO ELECTRIC STIMULATION. *(E.)* Kelly, K. A. (Mayo Fdn., Rochester, Minn.). *Am. J. Physiol.* 226(1): 230-234, 1974.

Silver wire electrodes, bipolar for stimulation (interelectrode distance of 5 mm) and monopolar for recording electric activity concurrent with stimulation, were implanted on the anterior all of the gastric corpus and antrum of 4 dogs. After a 2-week recovery period, the fasted, conscious dogs were given electric stimuli intermittently during 3 to 4 months. Pacesetter potentials were generated at both corporal and antral sites of stimulation. Since gastric smooth muscle is spontaneously active, the threshold for electric generation of pacesetter potential was determined by suppressing the natural pacemaker and gradually drecreasing the strength or duration of a suprathreshold stimulus, rather than by gradually increasing the strength of a subthreshold stimulus in the conventional way. As the strength of the stimulus was increased, a shorter duration of stimulation was required to reach threshold; strength *versus* duration curves in both the corpus and antrum were equilateral hyperbolas. However, the antrum had a smaller rheobase, a briefer chronaxie, and a shorter refractory period than the corpus and could be driven to faster frequencies by stimulation. These characteristics of the antrum, coupled with its slower intrinsic pacesetter potential frequency, facilitate entrainment of the distal stomach by the corporal pacemaker.

5044 ADRENERGIC RECEPTORS OF RAT ESOPHAGEAL SMOOTH MUSCLE. *(E.)* Buckner, C. K.; Christopherson, R. C. (Sch. Pharm. Univ. Wisconsin, Madison). *J. Pharmacol. Exp. Ther.* 189(2):467-475, 1974.

Adrenergic receptors in muscularis mucosa from the body of the rat esophagus have been investigated by using adrenergic agonists and competitive antagonists. Neither isoproterenol nor phenylephrine produced contraction of the tissue. After contraction induced by carbachol, both adrenergic agonists produced dose-dependent relaxation. Isoproterenol was approximately 1000 times more potent than phenylephrine, and only the former agonist relaxed the tissue to base-line levels. Cocaine potentiated the effects of phenylephrine; tropolone did not significantly alter the effects of isoproterenol. Phentolamine did not antagonize the relaxation produced by either agonist. Propranolol blocked effects of both agonists to a similar degree although it was approximately 1/1000 as potent as in other tissues. Sotalol[4-(2-isopropylamino-1-hydroxyethyl)methanesulfonanilide HCl] and practolol[4(2-hydroxy-3-

sopropylaminopropoxy)acetanilide HCl] were not
otent antagonists of the responses. The potency
ifferences between enantiomers of isoproterenol
nd trimetoquinol[1-(3',4',5'-trimethoxybenzyl)-
,7-dehydroxyl-1,2,3,4-tetrahydroisoquinolone HCl]
ere (in log units) 2.53 and 1.66, resp. These
alues are similar to those previously reported in
uinea-pig atrium and trachea and suggest a simi-
arity of receptor sites for these agonists in the
tissues. The results indicate that α-adrenergic
eceptors are not present in rat esophageal mus-
ularis mucosa and that relaxation in response to
drenergic agonists is due to activation of β-adrener-
ic receptors. Resistance to β-receptor antagonists
eed not invoke a postulate of different β receptor
ypes.

5045 INTRACELLULAR CYCLIC AMP LEVEL AND INTESTINAL SMOOTH MUSCLE RELAXATION. *(E.)*

Inatomi, N.; Takayanagi, I.; Uchida, M.; Takagi, K. (Fac. Pharm. Sci., Univ. Tokyo, Bunkyo-ku, Japan). *Eur. J. Pharmacol.* 26(1):73-76, 1974.

The intracellular level of cyclic AMP in the taenia from the guinea pig cecum was significantly increased by isoproterenol in a dose-dependent manner. Papaverine also increased the intracellular cyclic AMP level, but a synthetic antispasmodic agent, Aspaminol (1,1-diphenyl-3-piperidinobutanol hydrochloride) did not modify it. The results suggest that there are 2 mechanisms for the so-called papaverine-like actions. The increase in the intracellular cyclic AMP concentration produced by isoproterenol was prevented by propranolol. Papaverine caused relaxation but isoproterenol did not in taenia depolarized by KCl. This difference can be explained by the observation that the intracellular cyclic AMP level in the KCl-depolarized taenia is increased by papaverine but not by isoproterenol.

5046 FORCE-VELOCITY CHARACTERISTICS OF ESOPHAGEAL MUSCLE: EFFECT OF ACETYLCHOLINE AND NOREPINEPHRINE. *(E.)*

Cohen, S.; Green, F. (Univ. Pennsylvania Hosp., Philadelphia). *Am. J. Physiol.* 220(5):1250-1256, 1974.

A study was made of the effect of adrenergic and cholinergic agents on the force-velocity characteristics of the neurally mediated "off response" of the circular smooth muscle in the esophagus and lower esophageal sphincter of the opossum *in vitro*. Isotonic and isometric recordings were used to obtain the velocity of shortening and force, resp., during superfusion of acetylcholine and norepinephrine. All measurements were made with smooth muscle at its length of optimal tension development. To determine the effect of acetylcholine and norepinephrine on muscle contractility studies were performed using a 1.0-mM calcium Krebs solution. The maximum velocity of shortening and the peak force of esophageal muscle was 2.7 mm/sec and 8.2 g resp., at 1.0 mM calcium. Acetylcholine (10^{-5} M) increased the maximum velocity to 6.5 mm/sec and the peak force to 14.8 g. Norepinephrine (10^{-5} M) increased the maximum velocity to 6.5 mm/sec and the peak force to 15.4 g. The lower esophageal sphincter muscle responded similarly. It is concluded that both acetylcholine and norepinephrine significantly increase the maximum velocity and peak force of circular smooth muscle in the esophagus and lower esophageal sphincter, during the neurally mediated off response.

5047 MODIFICATION OF INTESTINAL STIMULATORY EFFECTS OF 5-HYDROXYTRYPTAMINE BY ADRENERGIC AMINES, PROSTAGLANDIN E_1 AND THEOPHYLLINE. *(E.)*

Grubb, M. N.; Burks, T. F. (Univ. Texas Med. Sch., Houston). *J. Pharmacol. Exp. Ther.* 189(2):476-483, 1974.

Isolated intestinal segments in dogs were perfused *via* the vasculature with Krebs-bicarbonate solution with or without drugs which depress motility: adrenergic amines, prostaglandin E_1, and theophylline. The excitatory agonists tested were 5-hydroxytryptamine, bethanechol and dimethylphenylpiperazinium iodide. Isoproterenol (1 and 5 μg/ml) shifted the 5-hydroxytryptamine dose-response curve to the right but did not affect intestinal contractions produced by the cholinergic agonists, bethanechol and dimethylphenylpiperazinium. Prostaglandin E_1 (1 μg/ml) did not alter responses to bethanechol, but caused a slight decrease in responses to dimethylphenylpiperazinium. Prostaglandin shifted the 5-hydroxytryptamine dose-responsive curve to the right. Theophylline (180 μg/ml) produced a shift to the right in the dose-response curve only for 5-hydroxytryptamine. Norepinephrine (0.1 and 0.2 μg/ml) produced shifts to the right in dose-response curves for dimethylphenylpiperazinium and 5-hydroxytryptamine but not for bethanchol. Methoxamine (10 and 50 μg/ml caused effects similar to those produced by norepinephrine. These data indicate that β-adrenergic agonists, prostaglandin E_1, and theophylline, which have in common the ability to increase intestinal cyclic AMP, antagonize motility responses to 5-hydroxytryptamine but have little or no effect on motility responses to cholinergic agonists. The effect of norepinephrine on dimethylphenylpiperazinium can be explained in terms of α-adrenergic receptor actions since methoxamine had similar effects on dimethylphenylpiperazinium responses. It is hypothesized that 5-hydroxytryptamine produces contraction of intestinal smooth muscle by somehow lowering intracellular levels of cyclic AMP or by blocking cyclic AMP inhibitory effects.

5048 STUDIES ON THE INTESTINAL ACTIONS OF TYRAMINE. *(E.)*

Heilman, R. D.; Lum, B. K. B. (Med. Coll. Wisconsin, Milwaukee). *Med. Biol.* 52(1):39-47, 1974.

The response to varying concentrations of tyramine (1600, 3200, and 6400 μg) in the isolated rabbit jejunum bathed in Ringer's solution is usually biphasic and consists of an initial stimulation followed by a slight relaxation but this relaxation is minimal in comparison to that produced by norepinephrine. Blockade of the stimulant action of tyramine by 500 μg methysergide added to the 50 ml organ bath did not enhance the relaxation. The relaxation produced by tyramine was abolished by 2 mg/kg i.m. reserpine pretreatment and was augmented by the presence of norepinephrine (50-100 μg) in the bathing medium. The relaxation thus appears to be due to a release of catecholamines by tyramine. However, the maximum relaxation produced by tyramine, even in the presence of 1-4 μg/liter norepinephrine was only about 33% of the maximum produced by norepinephrine alone. Tyramine antagonized the relaxation produced by 0.5-8.0 μg norepinephrine, 10-100 μg methoxamine, 0.2-1.0 μg isoproterenol, and 60 μg nitroglycerin. Quantitative studies suggest that this blocking action represents a major factor in the failure of tyramine to produce a maximum relaxation equal to that produced by norepinephrine. The relaxation produced by tyramine was also enhanced when the isolated jejunum was bathed in dog blood which contained relatively low concentrations of catecholamines. Enhancement of the response to tyramine by the blood appeared to be dependent on other factors.

5049 THE STUDY OF GUINEA-PIG GALLBLADDER REACTIVITY AFTER PGE$_1$ STIMULATION. *(E.)*

Stasiewicz, J.; Szalaj W,; Gabryelewicz, A. (Med. Acad., Bialystok, Poland) *Pol. J. Pharmacol. Pharm.* 26(1/2):249-252, 1974.

The effect of prostaglandin E$_1$ (PGE$_1$) on the reactivity of the isolated guinea pig gallbladder was investigated. 'PGE$_1$ (50-100 ng/ml) induced contractions in the gallbladder which resembled those seen following the administration of cholecystokinin. Stimulation of the β-adrenergic receptors by isoproterenol (0.5 ng/ml) significantly diminished the contractions induced by PGE$_1$; after β-adrenergic blockade by propranolol (0.1 μg/ml), the opposite effect was observed. Stimulation of the α-adrenergic receptors by phenylephrine (0.1 μg/ml) augmented the contracting effect of PGE$_1$; α-adrenergic blockade by phentolamine (0.1 μg/ml) had no effect on the reactivity of the gallbladder. The opposite motor effects of PGE$_1$ and isoproterenol on the isolated guinea pig bladder may depend on different effects of the two drugs on the cyclic AMP content of the organ. The data support the hypothesis that cholecystokinin and PGE have similar effects on the motor action of the musculature of the gallbladder.

5050 THE EFFECT OF PARIETAL CELL AND TRUNCAL VAGOTOMY ON GASTRIC AND DUODENAL CONTRACTILE ACTIVITY OF THE UNANESTHETIZED DOG. *(E.)*

Walker, G. D.; Stewart, J. J.; Bass, P. (Univ. Wisconsin Med. Ctr., Madison). *Ann. Surg.* 179(6):853-858, 1974.

The effect of parietal cell and truncal vagotomy on the motor function of the stomach and duodenum was studied in dogs in the interdigestive (fasted) and digestive (fed) states as well as under the influence of insulin (centrally acting), bethanechol, and histamine (smooth muscle acting). Motility index measurements were made with the use of strain gauge transducers sewn on to the serosal surface of the organ to be studied. Two distinct contractile patterns were present in the normal interdigestive state, whereby body and antral activity is associated with duodenal inhibition and duodenal activity is associated with diminished body and antral contractions. In animals with parietal cell vagotomy, this reciprocal inhibition was less prominent. Animals with a truncal vagotomy, however, possessed very little body or antral activity although the duodenum still contracted. The motility index measurements indicate that the basal state, as revealed by amplitude of contractions occurring during periods of low contractile activity between bursts, was unaffected by parietal cell or truncal vagotomy on either the antrum or duodenum. In the digestive state, parietal cell vagotomy resulted in continuous activity in the antrum but quiescent, short burst type activity in the duodenum. Truncal vagotomy resulted in a low continuous antral activity, with duodenal activity similar to that in parietal cell vagotomy. The response to insulin of animals not subjected to vagotomy was one of continuous body and antral activity with interrupted duodenal activity, a pattern similar to that observed during digestion in normal animals. Following parietal cell vagotomy, insulin caused a decreased body response, while following truncal vagotomy, insulin was without effect on the body and antrum. With either parietal cell or truncal vagotomy, insulin stimulated the duodenum. Bethanechol and histamine had no significant effects on antral response, regardless of the surgical condition, and bethanechol had no effect on duodenal response. However, histamine stimulated significantly the duodenum of animals with parietal cell vagotomy. It was concluded that parietal cell vagotomy had minimal disruptive effects on the antral-duodenal relationship while truncal vagotomy reduced antral contractile activity.

5051 GASTROINTESTINAL TRANSIT TIME IN OVARIAN CARCINOMA IRRADIATED WITH ^{60}CO. *(E.)*

Frankendal, B.; Junghagen, P. (Dept. Gynecol. Radiat. Ther., Umea Univ., Sweden). *Acta. Radiol.* [*Ther.*] *(Stockh.)* 13(2):129-140, 1974.

At least 4 weeks postoperatively, the effect of standarized abdominal ^{60}cobalt irradiation treatment on gastrointestinal transit time in 29 patients (31-75 yr) with ovarian carcinoma was determined by a standarized roentgen examination. Films of the abdomen were exposed every 1/2 hr with the patients prone after the medium had been swallowed, until it had begun to pass the ileocecal valve; patients were allowed to move about at will between exposures. Transit time was defined as the interval between the moment the patient swallowed the contrast medium and the moment it first appeared in the cecum. Conventional barium sulfate medium (200 ml) was used in 16 patients, while 13 received a physiologic contrast medium containing barium sulfate and nutritive substances: protein, fat, and carbohydrates, stabilized by trisodium citrate, and made up to 300 ml. Acceleration in the passage of the latter medium was demonstrated at 0-2000, 2000-4000, and 0-4000 rad (radiation absorbed dose). Only in the 6 patients in whom transit time was determined at 0-4000 rad and in whom the treatment series included a 15 day pause after 2000 rad was no acceleration evident. It is suggested that radiation-induced acceleration disappeared during the pause and returned when the irradiation was resumed. With the conventional medium, shortening of he time occurred at the dose difference of 0-4000 ad both after continuous treatment and after split-ourse treatment. However, no significant decrease n time could be recorded at dose differences of 0-2000 rad and 2000-4000 rad; in addition, no change was seen in association with the pause.

5052 CHANGES IN THE FREQUENCY OF THE SLOW WAVE FROM THE SMALL INTESTINE UPON PARTIAL AND FULL TRANSVERSE SECTION.

(E.) Kortezova, N. I. (Inst. Physiol., Bulgarian Acad. Sci., Sofia). *Dokl. Bolgar. Acad. Nauk.* 26(7):977-980, 1973.

Dogs were operated on to produce: transverse section of the longitudinal muscular layer of the small intestine with preservation of the circular layer and the mucosa; section of the circular muscular layer with preservation of the longitudinal layer and the mucosa; or section of both muscular layers with the mucosa and subsequent end-to-end joining. All of these surgical procedures led to a sharp drop in the frequency of the slow wave under the incision, with the frequency in the segment above remaining the same. In all cases, the drop in frequency took place gradually with the onset of arhythmia in the underlying segment. The gradient of the frequency of the slow wave was also disturbed. After the first month postoperatively, separate groups of slow waves with regular rhythm appeared periodically. The disruptions were most transient following section of the circular muscular layer only. In all groups, the difference between the frequencies of the slow wave above and below the section decreased with time. The longitudinal muscular and its appurtenant portion of the intramural nervous system, as well as the plexus submucosus, play an essential part in the propagation of the slow potential and in the adoption of this rhythm by the distally situated segment.

5053 FURTHER OBSERVATIONS ON THE SPASMOGENIC ACTIVITY OF CAERULEIN ON THE RAT PLYORUS.

(E.) Bertaccini, G.; Impicciatore, M.; De Caro, G.; Chiavarini, M.; Burani, A. (Inst. Pharmacol., Univ. Parma, Italy). *Pharmacol. Res. Commun.* 6(1):23-34, 1974.

The contracting activity of cerulein on the gastroduodenal junction of anesthetized female Wistar rats was compared with that of different peptidic and nonpeptidic spasmogenic compounds (phyllocerulein, cerulein heptapeptide, cerulein pentapeptide, cerulein tripeptide, cerulein dipeptide, cholecystokinin, bombesin, eledoisin, physalemin, bradykinin, acetylcholine, histamine, 5-hydroxytryptamine, morphine, barium chloride). Cerulein in doses as low as 2-5 ng/kg exerted a potent spasmogenic effect on the pyloric sphincter, while 160 ng/kg caused a complete block of duodenal effluent which lasted 20 min. With the exception of phyllocerulein and bombesin, which were as active as cerulein, all of the substances tested were much less active than the decapeptide. Several drugs (methysergide, lysergide, isoprenaline, orciprenaline, *N*-butylsopolammonium bromide, metoxamine, propranolol, xylamide, propenzolate, phemamide, diphemanil methyl sulfate thiemonium iodide, papaverine, 1-methyl-3-benzyloxyquinulidinium, dichloroisoproterenol, octopamine, dibenamine, prosympal, dihydroergotamine, atropine, mepyramine, pheniramine, epinephrine, and norepinephrine) were tested for their ability to antagonize the spasmogenic activity of cerulein on the pyloric sphincter. Of these drugs, only the sympathomimetic agents were able, at relatively low dose levels, to inhibit the effect of cerulein. The spasmogenic activity of cerulein may be 'physiologically' related to the stimulation of biliary and pancreatic secretion elicited by the peptide.

5054 ACTIONS OF CHOLECYSTOKININ AND SECRETIN ON THE MOTOR ACTIVITY OF THE SMALL INTESTINE IN MAN.

(E.) Gutierrez, J. G.; Chey, W. Y.; Dinoso, V. P. (Issac Gordon Ctr. Digest. Dis., Rochester, N. Y.). *Gastroenterology* 67(1):35-41, 1974.

The effects of cholecystokinin (CCK) and secretin on motor activity of the small intestine were studied by an intraluminal pressure recording technique in 24 healthy subjects (13 women and 11 men, aged 20-60 yr). CCK (1, 2, and 4 U/kg/hr i.v.) stimulated nonrhythmic type I waves in the duodenum and jejunum. Type III activity also tended to be increased, but this was not statistically significant. In contrast, secretin (0.5, 1, and 2 U/kg/hr i.v.) inhibited nonrhythmic type I and III waves. Interactions between the 2 hormones showed that CCK-stimulated upper intestinal motility was inhibited by secretin, and that secretin-inhibited motility was stimulated by CCK. The stimulatory effect of CCK on small bowel motor activity in man is in agreement with the previously reported stimulation of canine duodenal and jejunal motor activity by the C-terminal octapeptide of CCK. This study indicates that both CCK and secretin participate in the autoregulation of small bowel motility in man.

5055 EFFECT OF INSULIN ON THE REACTIVITY OF ISOLATED GUINEA PIG GALLBLADDER.

(Pol.) Stasiewicz, J.; Szalaj, W.; Gabryelewicz, A.; Kinalska, I. (Acad. Med., Bialystok, Poland). *Przegl. Lek.* 30(2):247-249, 1973.

5056 IN VITRO STUDIES OF AN ADRENERGIC RECEPTOR IN THE GALLBLADDER.

(Pol.) Stasiewicz, J.; Szalaj, W.; Gabryelewicz, A. (Acad. Med., Bialystok, Poland). *Przegl. Lek.* 30(2):244-246, 1973.

5057 MOTOR ACTIVITY OF THE EXTRAHEPATIC BILIARY TRACT.

(Fr.) Sarles, J. C. (Res. Unit. Dig. Dis., INSERM, Marseille, France). *Arch. Fr. Mal. App. Dig.* 63(2):139-150, 1974.

5058 A COMPARISON BETWEEN THE EFFECTS OF CHAIN LENGTH IN THE C-TERMINAL SEQUENCE OF SUBSTANCE P AND ANALOGOUS PHYSALAEMIN AND ELEDOISIN PEPTIDES ON THE ACTIVITY OF THE GUINEA PIG ILEUM.

(Ger.) Bergmann, J.; Bienert, M.; Niedrich, H.; Mehlis, B.; Oehme, P. (Central Inst. Molecular Biol., Acad. Sci. German Democratic Republic,

Berlin-Friedrichsfelde). *Experientia* 30(4):401-403, 1974.

5059 CANINE TACHYGASTRIA. *(E.)* Code, C. F.; Marlett, J. A. (Mayo Grad. Sch. Med., Univ. Minnesota, Rochester). *Mayo Clin. Proc.* 49(5): 325-332, 1974.

5060 THE RELATIONSHIP BETWEEN INTESTINAL TRANSIT TIME AND STOOL WEIGHT, AND THE EFFECTS OF BRAN. *(E.)* Heaton, K. W.; Payler, D.; Pomare, E. W.; Harvey, R. F. (Roy. Infirm., Bristol, England). *Gastroenterology* 66(4):843, 1974.

5061 THE EFFECTS OF FEEDING AND THE MYOELECTRIC COMPLEX ON TRANSIT IN THE CANINE SMALL INTESTINE. *(E.)* Summers, R. W.; Helm, J. (Univ. Iowa Coll. Med., Iowa City). *Gastroenterology* 66(4): 786, 1974.

5062 EFFECT OF GLUCAGON AND CAERULEIN ON PROPULSION AND MOTILITY IN THE RAT SMALL INTESTINE. *(E.)* Scott, L. D.; Summers, R. W. (Univ. Iowa Coll. Med., Iowa City). *Gastroenterology* 66(4):774, 1974.

5063 EFFECT OF GASTRIC ALKALINIZATION ON LOWER ESOPHAGEAL SPHINCTER PRESSURE AND SERUM GASTRIN. *(E.)* Kline, M. M.; Curry, N.; Sturdevant, R. A. L.; McCallum, R. W. (Wadsworth Hosp. Ctr., Los Angeles, Calif.). *Gastroenterology* 66(4): 724, 1974.

5064 EFFECTS OF GUT HORMONES ON MOTILITY OF THE ANTRUM AND DUODENUM IN DOGS. *(E.)* Lee, K. Y.; Hendricks, J.; Chey, W. Y. (Genesee Hosp., Rochester, N.Y.). *Gastroenterology* 66(4): 729, 1974.

5065 MECHANISMS OF THE CONTRACTING ACTIONS OF K, ACETYLCHOLINE AND Ba ON THE RABBIT'S EXCISED ILEUM, PARTICULARLY IN RELATION TO Ca. *(E.)* Araki, H.; Matsumoto, H. (Kobe Univ. Sch. Med., Japan). *Kobe J. Med. Sci.* 19(4):161-172, 1973.

5066 GASTRIC EMPTYING OF LIQUIDS AFTER DIFFERENT VAGOTOMIES AND PYLOROPLASTY. *(E.)* Gleysteen, J. J.; Hallenbeck, G. A. (Dept. Surg., Univ. Alabama, Birmingham). *Gastroenterology* 66(4):700, 1974.

5067 RELATIONSHIP BETWEEN SERUM GASTRIN LEVELS AND LOWER ESOPHAGEAL SPHINCTER PRESSURE IN FASTING SUBJECTS. *(E.)* Dodds, W. J.; Hogan, W. J.; Miller, W. N.; Arndorfer, R. C.; Barreras, R. F. (Med. Coll., Wisconsin, Milwaukee). *Gastroenterology* 66(4):686, 1974.

5068 EFFECT OF ESOPHAGEAL MOVEMENT ON LOWER ESOPHAGEAL SPHINCTER (LES) PRESSURE RECORDING. *(E.)* Dodds, W. J.; Stewart, E. T.; Hogan, W. J.; Stef, J. J.; Arndorfer, R. C. (Med. Coll. Wisconsin, Milwaukee). *Gastroenterology* 66(4):685, 1974.

5069 CONTRACTION OF CAT CIRCULAR ESOPHAGEAL SMOOTH MUSCLE AND ITS RELATIONSHIP TO THE ELECTRICAL "OFF RESPONSE". *(E.)* Diamant, N. E.; Chan, W. W. L. (Toronto Western Hosp., Canada). *Gastroenterology* 66(4):685, 1974.

See also, 5325, 5572.

SECRETION AND METABOLISM

5070 ADAPTIVE RESPONSES IN HEPATIC AND INTESTINAL CHOLESTEROGENESIS FOLLOWING ILEAL RESECTION IN THE RAT. *(E.)* Weis, H. J.; Dietschy, J. M. (Med. Clin., Johannes Gutenberg Univ., Mainz, Germany). *Eur. J. Clin. Invest.* 4(1):33-41, 1974.

Groups of Sprague-Dawley rats were prepared with a complete resection of either the jejunum or the ileum to study rates of cholesterol synthesis in the liver and small bowel. Fecal excretion of neutral and acidic sterols were measured 52 to 54 days after surgery and compared with similar measurements made in control animals that had had transection and reanastomosis of the intestine. Following resection of the ileum, the fecal excretion of neutral sterols (cholesterol + coprostanol) increased from 2.18 to 4.12 mg/day/100 g. In addition, the taurocholic acid pool decreased from 11.3 to 3.9 mg/100 mg, and the half-life for this bile acid declined from 2.8 to 0.4 days; hence, the metabolic production rate of taurocholic acid increased from 2.71 to 6.70 mg/day/100 mg. Coincidental with this accentuated turnover of both neutral and acidic sterols, the rate of *de novo* synthesis of cholesterol in the liver and small bowel (as judged by the rate of incorporation of 2-^{14}C-acetate into digitonin precipitable sterols) increased to a nearly identical degree in the animals with ileal resection. This was accomplished in the liver solely by an increase in the rate of synthesis per unit weight of tissue while in the intestine there was an increase in the weight of the jejunum as well as an increase in the rate of cholesterol synthesis per unit weight of tissue. The experimental group with jejunectomy did not differ significantly from control animals in rates of hepatic and intestinal cholesterol synthesis or in rates of eutral and acidic sterol excretion. These findings ndicate that following resection of the ileum in he rat there is increased endogenous synthesis of holesterol that fully compensates for the augmented xcretion of sterols which follows this operation so hat the circulating serum cholesterol pool remains ssentially unchanged.

071 ELECTROPHORESIS OF ISOLATED SECRETORY GRANULES FROM GUINEA-PIG SUBMAXILLARY GLAND. *E.)* Bhoola, K. D.; Cogdell, R. (Med. Sch., Univ. ristol, England). *Br. J. Pharmacol.* 50(3):419-423, 974.

072 RECENT ASPECTS OF HORMONE INTERACTIONS WITH CYTOPLASMIC MEMBRANES OF GASTROINTESTINAL TISSUES AND THE LIVER. *(Fr.)* Rosselin, G.; Freychet, P.; Bataille, D.; Fouchereau, M.; Rancon, F.; Broer, Y. (St. Antoine Hosp., Paris, France). *Biol. Gastroenterol. (Paris)* 7(1):5-18, 1974.

5073 CHOLANOIC (BILE) ACIDS IN HEPATIC AND NON-HEPATIC TISSUES OF MINIATURE SWINE. *(E.)* Dupont, J.; Oh, S. Y.; O'Deen, L. A.; Geller, S. (Dept. Food Sci., Nutrition, Colorado State Univ., Fort Collins). *Lipids* 9(4):294-297, 1974.

5074 THE EFFECT OF INTRAGASTRIC ADMINISTRATION OF ALCOHOL ON THE ETHANOL CONCENTRATIONS AND OSMOLALITY OF PANCREATIC JUICE, BILE, PORTAL AND PERIPHERAL BLOOD. *(E.)* Beck, I. T.; Paloschi, G. B.; Dinda, P. K.; Beck, M. (Hotel Dieu, Kingston, Canada). *Gastroenterology* 66(4):833, 1974.

5075 EFFECTS OF 3',5'-CYCLIC ADENOSINE MONOPHOSPHATE, 5-HYDROXYTRYPTAMINE, NORADRENALINE AND THEOPHYLLINE ON THE SIMULTANEOUS RELEASE OF PEROXIDASE AND AMYLASE FROM THE GUINEA PIG SUBMANDIBULAR GLAND. *(E.)* Carlsoo, B.; Danielsson, A.; Marklund, S.; Stigbrand, T. (Dept. Histol., Univ. Umea, Sweden). *Acta Physiol. Scand.* 91(2):203-210, 1974.

5076 ASSIMILATION OF GLUCOSE CARBON IN VIVO BY SALIVARY GLAND AND TUMOR. *(E.)* Vrba, R.; Winter, A.; Epps, L. N. (Fac. Med., Univ. British Columbia, Vancouver, Canada). *Am. J. Physiol.* 226(6):1424-1427, 1974.

5077 TOTAL AMINO ACID LEVELS OF PAROTID SALIVA AT DIFFERENT RATES OF GLAND FUNCTION. *(E.)* Feller, R. P.; Shannon, I. L.; Wescott, W. B. (VA Hosp., Houston, Tex.). *J. Dent. Res.* 53(3):772, 1974.

See also, 5157, 5314, 5315.

SECRETION AND METABOLISM

Stomach

5078 SOME PRELIMINARY FINDINGS ON THE EFFECT OF ACUPUNCTURE ON SECRETION AND ACID-INDUCED ULCERS IN THE RAT STOMACH. *(E.)* Dai, S.; Low, D. D.; Ng, C. K.; Ogle, C. W. (Fac. Med., Univ. Hong Kong). *Am. J. Chinese Med.* 2(2):181-191, 1974.

Preliminary findings are reported on the effect of acupuncture on gastric secretion and motility and on the incidence of acid-induced ulcers in female Wistar rats with pyloric occlusion. Two different sets of acupuncture loci were used: (1) those commonly used for the treatment of gastric ailments (acupuncture loci) and (2) those used for other purposes (acupuncture control loci). Acupuncture, when compared with its own acupuncture controls, did not significantly affect either the rate of gastric secretion or total acid output. Ether anesthesia tended to lower the rate of gastric secretion and total acid output. The incidence of rumenal ulceration, induced by the accumulation of gastric secretion over a period of 5 hours after pyloric occlusion, was 94% in the untreated controls. Acupuncture significantly reduced the incidence of ulceration in those receiving acupuncture between 30 minutes and 3 hours after pyloric occlusion. Atropine sulfate (0.8 mg/kg) and acupuncture significantly reduced the number of amberlite pellets passed out of the stomach when compared with controls. Although gastric secretion appears to be unaffected by acupuncture, there is a relationship between the lowering of gastric motility and a decrease in the incidence of rumenal ulceration. The mechanism by which stimulation at the various acupuncture loci is effective remains to be defined.

5079 GASTRIC SECRETION IN RELATION TO PARATHYROID DYSFUNCTION IN RATS WITH CHRONIC GASTRIC FISTULAE. *(E.)* Arnthorsson, G.; Ohrn, P. G.; Segerstrom, A. (Univ, Hosp., Uppsala, Sweden). *Uppsala J. Med.* 78:48-54, 1973.

Male Sprague-Dawley rats with chronic gastric fistulas were parathyroidectomized or treated with excess parathyroid hormone (80 USP-U/100 g/day s.c.). In the parathyroidectomized rats, no changes were seen in the gastric secretion of hydrogen ions, chloride, or mucus, as represented by total and free sialic acid. However, in the animals treated with excess parathyroid hormone, the gastric secretory volume and hydrogen ion concentration decreased, while the gastric mucus secretion increased slightly; the chloride concentration remained unchanged. The results indicate that the reduced gastric acidity seen in experimental hyperparathyroidism is consistent with an increased reflux of acid into the mucosa, or alternatively, a reduced secretion of hydrogen ions. In this way, altered parathyroid function might influence the physiology of the stomach, so that in the hyperparathyroid state it would be more susceptible to ulceration. The accelerated emptying of the stomach might protect the stomach but increase the acid load in the duodenum and the risk of duodenal ulceration.

5080 EFFECTS OF ETHANOL ON GASTRIC MUCOSAL ADENOSINE 3',5' MONOPHOSPHATE (cAMP).

(E.) Tague, L. L.; Shanbour, L. L. (Univ. Texas Med. Sch., Houston). *Life Sci.* 14(6):1065-1073, 1974.

The effects of ethanol on adenylate cyclase activity *in vitro* and *in vivo*, phosphodiesterase activity *in vitro*, and the cyclic adenosine monophosphate content *in vivo* were investigated in the gastric mucosa of Sprague-Dawley rats. NaF-stimulated adenylate cyclase activity was inhibited *in vitro* and *in vivo* by 20% ethanol. Consistent results could not be obtained without NaF since basal adenylate cyclase activity was so low (0.05 ± 0.10 pmol/min/mg protein). The phosphodiesterase activity was about 350 times greater than basal adenylate cyclase activity. Exposure to 2.0-20.0% ethanol significantly inhibited phosphodiesterase activity *in vitro*. Ethanol (5-20%) produced no measurable changes in the content of cyclic adenosine monophosphate in the gastric mucosa *in vivo*. These results suggest that cyclic adenosine monophosphate probably does not play a role in pathological responses of the gastric mucosa to ethanol although both adenylate cyclase and phosphodiesterase are inhibited by ethanol.

5081 THE GASTRIC ANTISECRETORY ACTIVITY OF PYRIDYL-2-THIOACETAMIDE (CMN 131). *(E.)*

Pascaud, X. B.; Errard, D. J.; Blouin, M. M. (Science Union, Co., Suresnes, France). *Am. J. Dig. Dis.* 19(6):503-515, 1974.

A thiocarboxamide derivative, pyridyl-2-thioacetamide (CMN 131), was investigated for its gastric antisecretory properties in male Sprague-Dawley rats and in mongrel dogs. CMN 131 activity following intraduodenal administration was determined in 4 hr pylorus-ligated rats and in gastric fistula rats under basal and carbachol-stimulated (18 μg/kg/hr s.c.) conditions. ED_{50} of acid output inhibition was 1.46 (0.92-2.31) mg/kg with intraduodenal administration and 3.85 (2.65-5.59) mg/kg s.c. The inhibition was further confirmed in Heidenhain-pouch dogs whose gastric secretion was stimulated by i.v. pentagastrin (3.20 μg/kg/hr) and i.v. histamine (160 μg/kg/hr). Under all conditions, CMN 131 in doses ranging from 1 to 10 mg/kg, whatever the administrative route, possessed a long-acting antisecretory property characterized first, by its significant depressing effect upon acid concentrations during basal secretion in rats and also with maximal pentagastrin and histamine stimulation in dogs; and second, by an equal inhibitory potency on gastric secretion stimulated by histamine and pentagastrin in dogs. With maximal continuous stimulation, a stable inhibition period of more than 3 hr resulted from a single i.v. dose of CMN 131 to dogs. Activity of CMN 131 followed the 2-component hypothesis in regard to Na^+ secretion, i.e. a very significant correlation occurred between H^+ and Na^+ whatever the inhibitory level. In addition, CMN 131 had an important inhibitory effect on both the concentration and output of pepsin. These results indicate that the compound CMN 131 may act at the parietal cell level by a mechanism which needs further research to elucidate the exact pattern of H^+ gastric production.

5082 DOSE-RESPONSE RELATION BETWEEN SYNTHETIC SALMON CALCITONIN AND GASTRIC ACID OUTPUT WITH AND WITHOUT STIMULATION BY PENTAGASTRIN.

(E.) Henrichs, H. R.; Heissmeyer, H. H.; Karg, R.; Petersen, K. G.; Petrin, A.; Kerp, L. (Med. Clin., Univ. Freiburg, Germany). *Acta Endocrinol. (suppl.)* 75(184):170, 1974.

Gastric acid output, concentration of total and ionized calcium and concentration of immunoreactive calcitonin were determined in male subjects during 4 to 6 hours. After evaluation of basic acid output, stimulated acid output was measured during constant infusion of 0.6 μg/kg/hr pentagastrin. While continuing the pentagastrin infusion, synthetic salmon calcitonin was given i.v. for about 2.5 hours. One group of 3 healthy subjects received stepwise increasing doses of 0.015, 0.031, 0.065, 0.124 μg/kg/45 min. of calcitonin. A second group of 5 was given 0.065 μg/kg/hr and a third group of 3 subjects was given 0.108 μg/kg/hr calcitonin infusions. In all 3 groups, gastric acid output increased during pentagastrin administration and decreased during calcitonin administration. There was no apparent relationship between reduced gastric acid output and a decrease of total and ionized serum calcium levels. It was concluded that calcitonin inhibits gastric acid output by direct action on gastric parietal cells without interference of serum calcium.

5083 COMPARISON OF GASTRIC AND PANCREATIC INHIBITORY PROPERTIES OF METIAMIDE AND ATROPINE.

(E.) Konturek, S. J.; Tasler, J.; Obtulowicz, W.; Cieszkowski, M. (Med. Acad., Krakow, Poland). *Biol. Gastroenterol. (Paris)* 7(1):29-35, 1974.

In dogs with chronic gastric and pancreatic fistulas, the effects of metiamide, (N-methyl-N'-(2[(5-methyl-imidazol-4yl)methio]ethyl)thiourea), a potent histamine-receptor antagonist, were compared with the effects induced by atropine on both gastric and pancreatic responses to various stimuli. Metiamide (2.9 mg/kg/hr) caused a strong inhibition of gastric acid secretion in response to histamine (80 μg/kg/hr, pentagastrin (2 μg/kg/hr), urecholine (100 μg/kg/hr), and a peptone meal. Atropine (100 μg/kg/hr) did not affect histamine-induced secretion but did inhibit responses to all other stimuli. Pancreatic secretion of bicarbonate and protein induced by secretin (1 U/kg/hr), duodenal acidification (4.0 mEq/hr), or cerulein (250 ng/kg/hr) was inhibited by atropine but virtually not affected by metiamide. This study shows that, in comparison with atropine, metiamide has a wider spectrum of inhibitory action on gastric secretion and shows a more favorable ratio of desired effects in depressing gastric secretion to undesirable side effects, such as inhibition of pancreatic secretion.

5084 EFFECT OF GLUCAGON AND PANCREATIC SECRETION ON PEPTIC ULCER FORMATION IN CATS. *(E.)* Konturek, S. J.; Demitrescu, T.; Radecki, T.; Thor, P.; Pucher, A. (Med. Acad., Krakow, Poland). *Am. J. Dig. Dis.* 19(6):557-564, 1974.

Gastric and pancreatic secretion as well as peptic ulcer formation were investigated in conscious cats with gastric and pancreatic fistulas. Intravenous infusion of glucagon (25 µg/kg/hr) caused a dose-related inhibition of gastric secretion induced by pentagastrin (0.5, 1, 2, 4, 8, or 16 µg/kg/hr) and by pH 5.0 peptone meal, but did not block secretion induced by histamine (160 µg/kg/hr). The dose response curves to pentagastrin alone and in combination with glucagon, as seen by Michaelis-Menten analysis, were typical of noncompetitive inhibition. Glucagon also inhibited pancreatic bicarbonate and protein outputs evoked by exogenous secretin (1.0 U/kg/hr), duodenal acidification, and pH 5.0 peptone meal. The formation of pentagastrin-induced (8 µg/kg/hr for 36 hr) peptic ulcers was prevented by glucagon, but ulcers induced by histamine were not so prevented. The blocking action of glucagon against pentagastrin-induced peptic ulcers, attributed mainly to its inhibitory effect on gastric acid and pepsin secretion, deserves meticulous attention because of possible usefulness for therapeutic purposes.

5085 THE ROLE OF GLUCOCORTICOIDS IN REGULATING SECRETION OF MUCOID COMPOUNDS BY THE STOMACH IN DOGS. *(Rus.)* Mozheiko, L. A. (Grodno Med. Inst., USSR). *Farmakol. Toksikol.* 36(5):560-561, 1973.

Histochemical studies were made of the sialomucin, sulfated mucin, and neutral mucopolysaccharide contents of the stomachs of 90 dogs and changes produced in them by feeding and administration of hydrocortisone. Secretion of all 3 types of mucins increased within 15 min after feeding, particularly in the surface epithelium and mucus cells of the pylorus. Newly synthesized secretion appeared in the apical part of the cells, while glycogen accumulated in the basal part. By 2 hr after feeding the acid mucopolysaccharide content had decreased in the chief cells, perhaps due to secretion of pepsinogen, and the processes of synthesis and secretion had attained equilibrium. After a single injection of hydrocortisone (5 mg/kg) little change occurred in the content of polysaccharide components. Sulfated mucins decreased slightly in the pit epithelium, while glycogen decreased in the rugal epithelium. Secretion from the glandular epithelium predominated over synthesis in the secretory granules when three 5 mg/kg doses of hydrocortisone were administered in 1 day. Injection of 5 or 50 mg/kg hydrocortisone for 10 days markedly suppressed synthesis of sulfated and sialomucins and, to a somewhat lesser extent, that of neutral mucopolysaccharides. No glycogen was observed in the surface epithelium, but the glycogen content of parietal cells increased, and massive deposits were observed in chief and accessory cells in the curvature. The number of fat cells decreased in the lamina propria and submucosa of the stomach. These findings suggest that hydrocortisone may cause disturbances in the mechanism of gastric secretion by either indirect or direct means.

5086 RECEPTORS INVOLVED IN THE ACTION OF 5-HT AND TRYPTAMINE ON THE ISOLATED RAT STOMACH FUNDUS PREPARATION. *(E.)* Frankhuijzen, A. L.; Bonta, I. L. (Med. Fac., Erasmus Univ., Rotterdam, Netherlands). *Eur. J. Pharmacol.* 26(2):220-230, 1974.

The participation of alpha-adrenoceptors in drug-induced effects on isolated stomach fundus preparation from male albino Wistar rats was investigated. The drugs (0.1 ml/5 ml organ bath) used were acetylcholine iodine; serotonin creatinine sulfate; tryptamine hydrochloride; methysergide hydrogen maleinate; mianserin hydrochloride; cyproheptadine hydrochloride; and piperoxan. Recognized anti-serotonin agents were also studied to determine whether the same type of receptors are involved in the responses of rat fundus to serotonin and tryptamine. Methysergide was a very active, slowly reversible inhibitor of the serotonin-induced fundic contractions, reaching a maximum after 2 hr preincubation. Piperoxan (an α-adrenolytic agent) was a competitive antagonist of serotonin, able to prevent or reduce the anti-serotonin activity of mianserin, cyproheptadine, and methysergide, indicating a common site of action. All antagonists affected the serotonin induced contractions more than those induced by tryptamine. It is suggested that the effect of serotonin on the fundus is a result of interaction of serotonin with one type of receptor, probably the classical D-tryptamine receptor, although the possibility of a stimulant α-adrenoceptor is not excluded. The response to tryptamine is the result of an interaction by tryptamine with two different types of receptors: one type is identical to that mediating the response to serotonin, while the other type is more resistant to inhibition by methysergide, piperoxan, cyproheptadine, or mianserin and may be identical with the phenoxybenzamine-resistant receptor.

5087 PROSTAGLANDIN E_2 AND THE STIMULATION OF RAT GASTRIC ACID SECRETION BY DIBUTYRYL CYCLIC 3',5'-AMP. *(E.)* Main, I. H. M.; Whittle, B. J. R. (Sch. Pharm., Univ. London, England). *Eur. J. Pharmacol.* 26(2):204-211, 1974.

In female Wistar rats, i.v. injection of dibutyryl cyclic 3',5'-AMP (4-20 mg/kg) caused a dose-dependent increase in gastric acid secretion during stimulation by pentagastrin (0.2 µg/kg/min), histamine (25 µg/kg/min), or carbachol (0.1 µg/kg/min). This was accompanied by a rise in gastric mucosal blood flow.

During basal secretion, dibutyryl cyclic AMP caused only relatively slight stimulation, although this response was greatly enhanced by threshold doses of pentagastrin or histamine. This cyclic AMP did not stimulate acid secretion, but did increase mucosal blood flow and decreased blood pressure. Theophylline (20 mg/kg) had no consistent effect on acid secretion. Prostaglandin E_2 (2.0 μg/kg/min i.v. or 5 μg/ml perfused through the gastric lumen at 0.2 ml/min) reduced reduced basal acid secretion but did not inhibit the secretory response to dibutyryl cyclic AMP. The present observations add support to the hypothesis that cyclic AMP plays a role in gastric acid secretion. The failure of prostaglandin E_2 to inhibit dibutyryl cyclic AMP stimulation *in vivo* is further evidence that prostaglandins inhibit other secretogogues at a stage prior to cyclic AMP activation of the secretory process. However, these conclusions depend on the untested assumption that dibutyryl cyclic AMP has an identical mode of action to endogenous cyclic AMP.

5088 EXPERIMENTAL EVALUATION OF THE "GASTRIC BARRIER" IN CSF SHUNT INFECTIONS. *(E.)*

Selker, R. G.; Bahnson, D.; Norden, C. A.; Wolfson, S. K., Jr. (Univ. Pittsburgh Sch. Med., Pa.). *J. Surg. Res.* 16(5):541-545, 1974.

In vitro and *in vivo* experiments were conducted to determine the effect of gastric pH on organisms infecting cerebrospinal fluid shunts. Gastric pH levels were analyzed in 10 patients (2-9 yr) during fasting, natural sleep, anesthesia, as well as at various times up to 120 min after feeding. Milk and formula feedings had considerable buffering effect on the gastric pH fasting value, raising levels up to pH 4.78, 15 min after feeding, but dropping to pH 2.08, 120 min after feeding. *Staphylococcus albus* and *Pseudomonas aeroginosa* were used to study the *in vitro* effect of gastric pH on common shunt bacteria and on duration of exposure. With 15 min exposure, very few colonies survived in solutions of less than pH 3, but growth was uninhibited at pH over 4. This limited critical range was further narrowed to a pH lethal range between 3.5 and 3.8. Stumptailed macaques and baboons fed a standard diet and infused via tube with 1-50 million *Serratia* bacteria/ml showed no evidence of pigmented *Serratia* in daily stool cultures, thus indicating the impenetrability of the gastric pH barrier. In investigating the possible use of low pH fluids (well tolerated and readily available) to achieve the critical pH level, no growth occurred after 15 min of bacterial exposure to Coca Cola; similar results were obtained with ginger ale. Should successful implantation of drainage from infected cerebrospinal shunt systems into the stomach be accomplished in an infant or child, regurgitation and aspiration could prove detrimental with the infection spreading to involve the lungs. However, antibiotic therapy and an adequate cough reflex should be sufficient to minimize this effect as it does with normal gastric content in infants where vomiting is common.

5089 STEP-DOSE COMPARED TO SEPARATE-DOSE RESPONSE GASTRIC SECRETION WITH HISTAMINE AND PENTAGASTRIN IN DOGS - A KINETIC ANALYSIS. *(E.)*

Hirschowitz, B. I.; Hutchinson, G. (Dept. Med., Univ. Alabama, Birmingham). *Scand. J. Gastroenterol.* 9(2):207-217, 1974.

In 7 fistula dogs, gastric juice volume and H, Cl, Na, K, and pepsin secreted in response to graded doses of histamine in 8 separate single doses (2-125 μg/kg/hr) and in 7 incremental 45-min steps (2-150 μg/kg/hr) on the same day were compared with the responses to pentagastrin given in 7 single separate doses (0.1-6 μg/kg/hr) and in 6 incremental 45-min steps (0.1-5 μg/kg/hr). For separate-dose histamine, peak output occurred in the 4th to 8th sample after beginning the single dose infusion, with the longer delays occurring at the lower doses. In almost all the step doses, maximum output occurred in the 3rd 15-min period of each 45-min dose step. For pentagastrin, peak output was mostly in the 3rd and the 4th 15-min period of single dose infusion and in the 2nd of the three 15-min periods of each step dose. The calculated H+ maximum output (Vmax) was in the order separate-dose pentagastrin > separate-dose histamine > step-dose histamine > step-dose pentagastrin in the ratios 100:99:92:80. The Vmax for step-dose pentagastrin was significantly lower than the others, presumably due to fade with pentagastrin. Values for volume, Cl^-, Na^+, K^+, and pepsin were similarly and proportionately affected by a change in drug or in mode of drug administration. Km values (doses which stimulated output at 50% of Vmax rates) were in the order step-dose histamine > separate-dose histamine > separate-dose pentagastrin > step-dose pentagastrin, in a molar ratio of 100:50:0.7:0.35. Pepsin was stimulated by pentagastrin in a dose-dependent fashion; it was not stimulated by histamine. The shorter step-dose technique, with certain provisos and corrections, is appropriate for comparing and characterizing drugs acting on gastric secretion and for describing the stomach under study.

5090 GASTRIC HISTAMINE METABOLISM AFTER ACUTE PYLORIC LIGATION IN THE SHAY RAT. *(E.)*

McAlpin, C. D.; Moore, T. C.; Lemmi, C. A. E. (Univ. California Los Angeles-Harbor Gen. Hosp., Torrance). *Arch Surg* 109(1):65-67, 1974.

Acute pyloric ligation (Shay preparation) in male, inbred Lewis rats caused increases with peak elevations in both gastric histamine formation from histidine decarboxylase enzyme activity (12-fold) and total cellular histamine content (2-fold) of the stomachs 4 hr postligation. Return to essentially normal levels for both occurred 24 hr after ligation. This peak elevation period was also the approximate time of peak increases of gastric secretion in volume and acidity observed by others in the Shay rat. In the interval between 4 and 24 hr, gastric histidine decarboxylase activity remained somewhat elevated above normal levels while gastric histamine concentration was slightly depressed. Subcellular gastric concentrations of histamine were increased in the mitochondrial and supernatant fraction, decreased in the microsomal fraction, and unchanged in the nuclear fraction. These findings indicate that increased gastric histidine decarboxylase activity and histamine content are related temporally to increases in gastric secretion in volume and acidity which appear before peptic ulceration occurs. The increases in the mitochondrial and supernatant subcellular concentrations of histamine in the early post ligation period suggest that these subcellular components may be of importance in the changes observed following acute pyloric ligation in the rat.

5091 IN VITRO BIOSYNTHESIS AND SECRETION OF PEPSINOGEN BY RABBIT GASTRIC MUCOSA. *(E.)* Sutton, D.; Donaldson, R. M. (Boston Univ. Med. Sch., Mass.). *Gastroenterology* 66(4):786, 1974.

5092 INHIBITION OF GASTRIC SECRETION AND ADENYL CYCLASE-cAMP SYSTEM BY H_2 RECEPTOR ANTAGONIST, BURIMAMIDE. *(E.)* Gabrys, B. F.; Nyhus, L. M.; Bobbeck, C. T. (Dept. Surg., Univ. Illinois, Chicago). *Gastroenterology* 66(4):695, 1974.

5093 RELEASE OF GASTRIN FROM ISOLATED PERFUSED GASTRIC ANTRA. *(E.)* Dretler, R.; Wesdorp. I. C.; Fischer, J. E. (Massachusetts Gen. Hosp., Mass.). *Gastroenterology* 66(4):686, 1974.

5094 ANALYSES OF LIPID FRACTIONS FROM THE STOMACH OF CHICK EMBRYOS. *(It.)* Cocco, L.; Antonucci, A.; Pallotta, R.; Zaniboni, G. (Inst. Normal Human Anat. Gen. Histol. Embryol., Univ. Chieti, Italy). *Boll. Soc. Ital. Biol. Sper.* 49(12):708-714, 1973.

5095 MECHANISMS OF CALCIUM-INDUCED GASTRIC HYPERSECRETION. *(E.)* Behar, J.; Hitchings, M.; Smyth, R. D. (VA Hosp., West Haven, Conn.). *Gastroenterology* 66(4):663, 1974.

5096 THE EFFECT OF STRESS IN GHOSH-LAI RATS ON THE DEPLETION OF THE MUCOUS BARRIER AND MORPHOLOGY OF THE GASTRIC MUCOSA. *(E.)* Bobak, L.; Zwierz, K.; Badurski, J.; Ito, H.; Glass, G. B. J. (New York Med. Coll., N.Y.). *Gastroenterology* 66 (4):667, 1974.

5097 PLASMA GASTRIN RESPONSE TO COFFEE, SANKA, CAFFEINE AND WATER. *(E.)* Berkowitz, J. M.; Shields, Jr., J. E.; Andersen, I. H.; Praissman, M. (Nassau County Med. Ctr., East Meadow, N.Y.). *Gastroenterology* 66(4):666, 1974.

5098 VAGAL AFFERENT NERVE ENDINGS IN THE GASTRIC ANTRAL MUCOSA OF THE RAT. *(E.)* Clarke, G. D.; Davison, J. S. (Dept. Physiol., Univ. Dundee, Scotland). *J. Physiol. (Lond.)* 239(1):41P-42P, 1974.

5099 RESERPINE AND GASTRIC ACID SECRETION, HISTAMINE AND HISTIDINE DECARBOXYLASE IN RATS. *(E.)* Sewing, K. F.; Frisch, G. (Dept. Pharmacol., Univ. Tubingen, Germany). *Acta Hepatogastroenterol.* 21(2):142-146, 1974.

5100 INTESTINAL PHASE OF GASTRIC ACID SECRETION: AUGMENTATION OF MAXIMAL RESPONSE OF HEIDENHAIN POUCH TO GASTRIN. *(E.)* Slaff, G. F. (Wadsworth VA Hosp. Ctr., Los Angeles, Calif.). *Gastroenterology* 66(4): 656, 1974.

5101 EXPERIMENTAL INVESTIGATIONS OF GASTRIC EC-CELLS. *(E.)* Grube, D.; Forssmann, W. G. (Inst. Anatomy, Univ. Heidelberg, Germany). *Acta Hepatogastroenterol.* 21(2):147-150, 1974.

5102 THE EFFECT OF METOCLOPRAMIDE ON HUMAN GASTRIC SECRETION. *(E.)* Meeroff, M.; Rofrano, J. A.; Ferreira, J. A.; Meeroff, J. C. (Munic. Sanit., Buenos Aires, Argentina). *Gastroenterology* 66(4):745, 1974.

5103 CHANGES IN ELECTROLYTES IN THE SERUM AND GASTRIC JUICE OF RATS CAUSED BY PENTAGASTRIN AND BETAZOLE. *(Ger.)* Priebe, K.; Hantschmann, N. (Surg. Clin., Univ. Kiel, Germany). *Z. Exp. Chir. (Jena)* 6(6):423-436, 1973.

5104 INHIBITION OF GASTRIC SECRETION STIMULATED BY INTRADUODENAL ADMINISTRATION OF VARIOUS FATTY ACIDS. *(Ger.)* Schmidt-Wilcke, H. A.; Steinhagen, E.; Steinhagen, P.; Lapp, M. (Med. Clin., Univ. Marburg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79: 873-876, 1973.

5105 CAUSE OF THE DAMAGE PRODUCED BY ACETYLSALICYLIC ACID AND PHENYLBUTAZONE IN THE GASTRIC MUCOSA. *(Ger.)* Hahn, K. J. (Med. Clin., Univ. Heidelberg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:828-830, 1973.

5106 GASTRIN AND G CELLS IN THE PYLORIC MUCOSA UNDER NORMAL AND PATHOLOGICAL CONDITIONS. *(It.)* Fabris, G.; Marzola, A.; Beltrami, C. A. (Inst. Pathol. Anat. Histol., Univ. Ferrara, Italy). *Riv. Patol. Clin. Sper.* 13(1/2):49-54, 1972-1973.

5107 DRUG-INDUCED VAGOTOMY PRODUCED BY ACUTE HYPERMAGNESEMIA. *(Ger.)* Strauch, M.; Lux, G.; Lux, E.; Ottenjann, R. (Munic. Hosp., Munchen-Neuperlach, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:834-837, 1973.

5108 THE EFFECT OF INTRAGASTRIC CALCIUM ON GASTRIC ACID SECRETION IN MAN. *(Ger.)* Holtermuller, K. H.; Go, V. L. W. (Mayo Clin., Rochester, N.Y.). *Verh. Dtsch. Ges. Inn. Med.* 79:832-834, 1973.

5109 INITIAL OBSERVATIONS ON THE INHIBITORY ACTION OF UROGASTRONE ON GASTRIC SECRETORY RESPONSES IN MAN. *(E.)* Gillespie, I. E.; Elder, J. B.; Ganguli, P. C.; Gregory, H.; Gerring, L. (Manchester Royal Infirm., England). *Gut* 15(4):337, 1974.

5110 THE INFLUENCE OF THE INNERVATED GASTRIC ANTRUM ON GASTRIN AND ACID RESPONSES TO INSULIN HYPOGLYCAEMIA IN MAN. *(E.)* Lyndon, P. J.; Walsh, J. H.; Johnston, D. (Leeds Gen. Infirm., England). *Gut* 15(4):348, 1974.

See also, 4977, 4982, 4991, 4996, 5009, 5037, 5118, 5448, 5464, 5465, 5492, 5503.

SECRETION AND METABOLISM

Pancreas

5111 EXOCRINE PANCREATIC SECRETION AND OUTPUT OF BILE IN HUMANS UNDER CONDITIONS OF HYPOGLYCEMIA AND ADMINISTRATION OF ATROPINE. *(E.)* Wolfert, W.; Hartmann, W.; Hotz, J. (Univ. Ctr. Internal Med., Pediatr., Ulm, Germany). *Digestion* 10(1):9-16, 1974.

Possible neural, as compared to hormonal, regulation of exocrine pancreatic secretion, bile output, and gastric HCl secretion was investigated in 18 healthy volunteers (11 male, 7 female) with constant duodenal infusion of secretin (1 clinical U/kg), to all subjects, after an initial i.v. injection of 2 clinical U/kg 30 minutes previously. Subsequent measurements of pancreatic secretion as to volume, enzymes (trypsin and amylase), and bicarbonate; of bile output; and of gastric HCl secretion, were made under the following conditions: i.v. insulin (0.25 U/kg) to one group to produce hypoglycemia; the same insulin administration plus 10% glucose infused for the remainder of the test to a 2nd group; and atropine (1 mg) both i.v. and s.c. followed by i.v. insulin (0.25 U/kg) to a 3rd group. Hypoglycemia produced increased output and concentration of trypsin and amylase, and greater levels of bile output and HCl secretion. Atropine did not block any insulin effects except the HCl secretion increase due to hypoglycemia. Simultaneous infusion of glucose counteracted the effects of insulin. Because some expected atropine effects were not realized here, it is postulated that a higher dose of atropine (not possible in man) would be necessary. However, other vagolytic drugs with lesser side effects in humans might be more effective on the pancreas and on bile output in insulin hypoglycemia, especially under the assumption that the latter is a strong vagal stimulus. Atropine inhibition of vagally stimulated pancreatic secretion has been demonstrated in animal experiments.

5112 THE EFFECT OF DIPHENYLHYDANTOIN ON EXOCRINE PANCREATIC FUNCTION. *(Ger.)* Heidbreder, E.; Heidland, A. (Med. Clin., Univ. Wurzburg, Germany). *Dtsch. Med. Wochenschr.* 99(18):958-960, 1974.

Exocrine secretion was studied in the perfused isolated pancreas of fasted, pentabarbital-anesthetized male and female cats during intraarterial infusion of secretin (0.2 U/min) or after single intraarterial injections of cholecystokinin-pancreozymin (0.125 U) or acetylcholine (1 μg). A single intraarterial injection of diphenylhydantoin (10-75 mg) decreased the output of pancreatic juice. This decrease lasted only a short time with smaller doses of the drug but persisted or was only partially reversible after larger doses. Simultaneously, significant increases occurred in the total outputs of lipase, amylase, and total protein. No clear-cut relation was found to exist between enzyme secretion and the dose of diphenylhydantoin. Infusion of atropine (1.1×10^{-5}M) failed to inhibit enzyme liberation. Diphenylhydantoin had no effect on secretion of Na^+, K^+, and Cl^-, but it did cause a slight decrease in total Ca^{++} and Mg^{++}, at least after administration of smaller doses. It is suggested that stimulation of enzyme secretion by diphenylhydantoin may be mediated by nonspecific effects stimulating acinar cells such as changes in membrane permeability with an increased influx of cations or acinar cell damage.

5113 ACETYLCHOLINE CAUSES A NET DECREASE IN PHOSPHATIDYLINOSITOL AND A NET INCREASE IN PHOSPHATIDIC ACID IN MOUSE PANCREAS. *(E.)* Hokin-Neaverson, M. (Dept. Psychiatry, Physiol. Chem., Univ. Wisconsin, Milwaukee). *Biochem. Biophys. Res. Commun.* 58(3):763-768, 1974.

In order to see whether there were any net changes in the levels of phospholipids in response to acetylcholine in the pancreas, *in vitro* incubation of mouse pancreas with acetylcholine (10^{-5}M and 10^{-7}M) was performed. The 10^{-5}M concentration led to a net decrease (1.31 to 0.93 mols/g fresh tissue) of phosphatidylinositol levels and to a net increase (0.45 to 0.82 μmols/g fresh tissue) of phosphatidic acid levels. There were no significant changes in the levels of phosphatidylinositol and of phosphatidic acid with 10^{-7}M acetylcholine. (In all vessels to which acetylcholine was added, eserine sulfate, 10^{-4}M, was also added in order to inhibit acetylcholine-esterase activity.) When atropine was added to acetylcholine-stimulated tissue, the above changes were reversed: the level of phosphatidic acid fell and the level of phosphatidylinositol rose. The levels of other phosphatides which were measured (phosphatidylcholine, phosphatidylethanolamine, phosphatidylserine, sphingomyelin, and lysophosphatidylcholine) did not change significantly.

5114 ENZYMATIC ACTIVITY AND DIVALENT CATION CONTENT OF PANCREATIC JUICE. *(E.)* Sullivan, J. F.; Burch, R. E.; Magee, D. F. (Creighton Univ., Omaha, Nebr.). *Am. J. Physiol.* 226(6):1420-1423, 1974.

Some of the various pancreatic enzymes have been shown to be metalloenzymes, and this study was undertaken to evaluate the relationship of calcium, magnesium, and zinc content of pancreatic juice with volume, protein content, protease, and amylase activity in pigs in the basal state and following stimulation. Secretin was given i.v. throughout each experiment at a rate of 0.25 U/min in 2 ml of saline. Vagal stimulation, 10-20 min, increased amylase activity to a greater extent than total protein or protease activity. There was a 16-fold increase of zinc output, 4-fold increase in magnesium, and nearly a 3-fold mean increase in calcium, upon vagal stimulation. Cholecystokinin, administered i.v. (10 U), resulted in a much steeper relationship between zinc and protease, and between zinc and total protein than did vagal stimulation or gastrin pentapeptide (i.v., 10 μg). In general, cholecystokinin stimulation produced a 29% increase in total volume, together with increased outputs of zinc, calcium, protein, protease, and amylase, but not magnesium. Administration of gastrin pentapeptide yielded increased production of zinc, calcium, and magnesium. These divalent cations, which appear to be bound to protein, correlate with the amylase and protease activities measured in pancreatic juice. Other calculated correlation coefficients and plotted regression lines are analyzed and discussed.

5115 ACETYLCHOLINE INCREASES THE LEVEL OF DIGLYCERIDE IN MOUSE PANCREAS. *(E.)* Banschbach, M. W.; Geison, R. L.; Hokin-Neaverson, M. (Dept. Pediatr., Psychiatry, Physiol. Chem., Univ. Wisconsin, Milwaukee). *Biochem. Biophys. Res. Commun.* 58(3):714-718, 1974.

The effect of acetylcholine on the pool size of diglycerides in mouse pancreas *in vitro* was investigated to test the hypothesis that diglycerides are a product of phosphatidylinositol and phosphatidic acid breakdown induced by acetylcholine. The quantitative analysis of diglycerides was made possible by use of a rapid, sensitive radiometric procedure. Incubation of Swiss-Webster mouse pancreas with 10^{-5} or 10^{-4} M acetylcholine plus 10^{-4} physostigmine, added to inhibit acetylcholine-esterase activity, significantly increased tissue diglyceride levels. Diglyceride rose from 0.5 μM/g fresh tissue in unstimulated pancreas to 1.2 μM with 10^{-5} acetylcholine and to 3.6 μM with 10^{-4} M acetylcholine. The linear increase in diglyceride level with time at 10^{-4} M acetylcholine was blocked and reversed by 10^{-5} M atropine. When atropine was added, the diglyceride level fell to the control, unstimulated value. The increase in diglyceride level was greater than could be accounted for by hydrolysis of phosphatidylinositol or phosphatidic acid. Thus, acetylcholine-induced changes in the level of pancreas diglycerides are not directly linked to changes in phospholipid metabolism. Rather, they may represent a separate effect with potential for changing properties of pancreatic membrane elements.

5116 PLASMA ENZYME AND ISOENZYME CHANGES DURING PERFUSION OF THE ISOLATED PIG LIVER. *(E.)* Buttery, J. E.; Parbhoo, S. P.; Baron, D. N. (Roy. Free Hosp., London, England). *Clin. Sci. Mol. Med.* 46(1):105-112, 1974.

Changes in the perfusate activities of aspartate transaminase, lactate dehydrogenase, its 'LD-5' component, sorbitol dehydrogenase, ornithine carbamoyltransferase, and the isoenzyme patterns of lactate dehydrogenase and aspartate transaminase were investigated during the perfusion of 11 pig livers with human blood. The aspartate transaminase values were sensitive indicators of liver damage provided the degree of hemolysis was small. Appearance on electrophoresis of the mitochondrial isoenzyme of aspartate transaminase indicated severe liver damage. Sorbitol dehydrogenase activity was also a sensitive index of liver cell damage, and one in which hemolysis did not interfere. The total lactate dehydrogenase activity was an unreliable indicator of liver cell damage in that it largely reflected the degree of hemolysis rather than liver cell damage. However, the isoenzyme pattern of lactate dehydrogenase on electrophoresis distinguished liver cell damage from hemolysis. The chemical determination of 'LD-5' was not a sensitive index of pig liver damage, as this fraction is found only in low concentration in pig liver. Ornithine carbamoyltransferase was a poor marker of liver cell damage.

5117 EFFECTS OF NUTRITIONAL STATE AND OF ADMINISTRATION OF GLUCOSE GLIBENCLAMIDE OR DIAZOXIDE ON THE STORAGE OF AMYLASE IN MOUSE PANCREAS. *(E.)* Danielsson, A. (Univ. Umea, Sweden). *Digestion* 10:150-161, 1974.

The relation between endocrine and exocrine pancreatic secretion was studied by measuring pancreatic amylase levels during starvation followed by refeeding and also effects of substances influencing insulin secretion. Starvation up to 48 hr induced a considerable fall in pancreatic amylase content of pancreas in female mice, which was readily restored by refeeding.. The enzyme changes were parallel to variations in serum glucose and insulin. After starvation the amylase content could be increased by i.p. glucose (7 g/kg) or the insulin secretagoue glibenclamide (4 mg/kg). The glucose-induced rise in amylase content was abolished by concomitant i.p. diazoxide (200 mg/kg), an inhibitor of glucose-induced insulin release. These findings suggest that insulin has a role in maintaining a high level of amylase in the exocrine pancreas. The parotid gland displayed a transient increase in amylase content during starvation, followed by a decrease to normal if starvation continued. No direct relation to variations in serum glucose and insulin was observed.

5118 AUGMENTED ACID AND GASTRIN RESPONSE TO MEALS AFTER PANCREATIC DUCT LIGATION. *(E.)*

Peterson, J. J.; Militello, J. M.; Go, V. L. W.; Wilson, S. D. (Med. Coll. Wisconsin, Milwaukee). *J. Surg. Res.* 16(4):353-359, 1974.

The role of gastrin in the hypersecretion induced by pancreatic duct ligation was studied in 8 mongrel dogs with denervated Heidenhain fundic pouches with Gregory cannulas. Pancreatic duct ligation resulted in significant 24-hr gastric hypersecretion from the denervated fundic pouches. Fasting serum gastrin concentrations after ligation were not significantly different from those in control period. Antrectomy reduced the 24 hr acid secretion to near control levels, and fasting serum gastrin was lowered. The acid response during the first 2 hr after a standard meal was markedly augmented in dogs with pancreatic duct ligation. Peak gastrin concentrations were significantly increased at 30 and 60 minutes after a standard meal in dogs with pancreatic duct ligation. The 2-hr integrated gastrin response to a meal was increased after ligation. Antrectomy abolished both the augmented acid and agumented gastrin response to a meal. It is concluded that an augmented gastrin response in pancreatic duct ligation animals results from the inadequate release of a fat-stimulated hormone from the duodenum and proximal small bowel that normally occurs during a meal and that this hormone acts in part to inhibit meal-stimulated gastrin release from the antrum.

5119 CANINE PANCREATIC RESPONSES TO INTESTINALLY PERFUSED PROTEIN DIGESTS. *(E.)*

Meyer, J. H.; Kelly, G. A. (Dept. Med., Univ. California, San Francisco). *Gastroenterology* 66(4):855, 1974.

5120 PURE PANCREATIC SECRETION COLLECTED FROM WITHIN THE PANCREATIC DUCT AT DUODENOSCOPY. PRELIMINARY RESULTS OF BIOCHEMICAL STUDIES. *(E.)*

Cotton, P. B.; Cremer, M.; Robberecht, P.; Deltenre, M.; Ponder, B.; Christophe, K. (St. Thomas Hosp., London, England). *Gastroenterology* 66(4):678, 1974.

5121 EFFECT OF ISOPROTERENOL ON PANCREATIC RESPONSES TO EXOGENOUS AND ENDOGENOUS CHOLECYSTOKININ. *(E.)*

Kelly, G. A.; Rose, R. C.; Nahrwold, D. L. (Dept. Surg., Pennsylvania State Univ., Hershey). *Gastroenterology* 66(4):722, 1974.

5122 STIMULATION OF THE EXOCRINE PANCREAS IN MAN BY INTRADUODENAL ADMINISTRATION OF ALBUMIN AND AN ALBUMIN HYDROLYZATE. *(Ger.)*

Dollinger, H. C.; Goebell, H. (Ctr. Internal Med. Pediatr., Univ. Ulm, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:856-859, 1973.

5123 ACETYLCHOLINE AND PHOSPHATIDYLINOSITOL METABOLISM IN MOUSE PANCREAS. *(E.)*

Hokin-Neaverson, M. (Univ. Wisconsin, Madison). *Fed. Proc.* 33(5):pt II, 1527, 1974.

See also, 5083, 5084.

SECRETION AND METABOLISM

Hepatobiliary Tract

5124 TOTAL BODY WASHOUT AND EX VIVO LIVER PERFUSION IN ACUTE HEPATIC FAILURE. A COMPARATIVE STUDY. *(E.)*

Wakabayashi, A.; Kubo, T.; Gilman, P.; Charney, K.; Connolly, J. E. (Dept. Surg., Univ. California, Irvine). *Arch. Surg.* 109(1):52-56, 1974.

The efficiency of *ex vivo* liver perfusion and total body washout to clear bilirubin in the treatment of acute hepatic failure was compared in jaundiced mongrel dogs. Six hour *ex vivo* liver perfusion was performed in 5 dogs by perfusing the portal vein of the *ex vivo* liver with blood from the recipient's artery. Hepatic venous blood from the *ex vivo* liver was returned to the recipient's vein by a pulsatile blood pump. Total body washout was performed in 6 dogs using hypothermic cardiopulmonary bypass. All animals tolerated both procedures well. With *ex vivo* liver perfusion, serum bilirubin levels fell from 4.93 to 0.86 mg/100 ml, a clearance rate of 78.38%. With total body washout, bilirubin levels fell from 6.74 to 0.54 mg/100 ml, a clearance rate of 91.62%, significantly higher than that of *ex vivo* liver perfusion. These results indicate that both ex vivo liver perfusion and total body washout are equally safe in the treatment of liver failure, but total body washout appears to be more efficient and rapid in clearing circulating toxic substances than does *ex vivo* liver perfusion.

5125 PROTECTION FROM BILIRUBIN NEPHROPATHY IN JAUNDICED GUNN RATS. *(E.)*

Odell, G. B.; Bolen, J. L.; Poland, R. L.; Seungdamrong, S.; Cukier, J. O. (Johns Hopkins Univ. Sch. Med., Baltimore, Md.). *Gastroenterology* 66(6):1218-1224, 1974.

Since bilirubin nephropathy in adult homozygous jaundiced Gunn rats (jj) is associated with abnormally high bilirubin concentrations accumulated in the renal papillae (not seen, however, up to weaning at about 21 days), this study was undertaken to observe the chronological development of the condition and also the possible prevention by lowering circulating bilirubin levels. The inclusion of agar, with its high binding affinity for bilirubin, 2% by weight in the diet of 17 (jj) rats resulted in greater fecal excretion of bile pigments as measured by bilirubin and urobilin. No influence of age was seen in the 6-15 month old animals examined. The concentrations of bilirubin in serum, adipose tissue, and renal medullae were less than in 13 (jj) littermates fed a standard diet. Comparison of renal clearance of free water in 5 month old animals showed that standard diet (jj) animals had significantly lower rates than heterozygous nonjaundiced rats (Jj), but rates for the agar diet (jj) animals did not significantly differ from the (Jj) rats. The preservation of normal renal clearance of free water by the agar diet (jj) rats was associated with a 20% reduction of bilirubin concentrations in the serum and adipose tissue. The mechanism by which agar increases bile pigment fecal excretion and lowers the circulating bilirubin concentration, and thereby decreases renal accumulation, is not certain; agar could bind bilirubin either derived from the biliary secretion or from that which enters the intestinal lumen by direct diffusion from the intestinal circulation. The results suggest that nephropathy of adult (jj) rats is secondary to the accumulation of bilirubin in the renal papillae rather than being a result of the genetically deficient medulla.

5126 THE PHYSICOCHEMICAL FACTOR REQUIRED FOR THE BILIARY EXCRETION OF ORGANIC CATIONS AND ANIONS.

(E.) Hirom, P. C.; Hughes, R. D.; Millburn, P. (St. Mary's Hosp. Med. Sch., London, England). *Biochem. Soc. Trans.* 2(2):327-330, 1974.

In this study, factors influencing biliary excretion of foreign organic compounds in the rat were investigated, including the necessary presence of a polar ionizable group (anion or cation) and a minimum molecular weight related to the crucial factor of lipid solubility. The partition ratios (P) of a structurally related series of 9 monoquaternary ammonium cation compounds and of 5 diquaternary ammonium cations, both sets ^{14}C-labeled, were measured between octan-1-ol and 0.1 M phosphate buffer, pH 7.4, a model system used for both biological lipid and aqueous phases. Sample (0.2 ml) of both the upper organic layer and the lower aqueous layer were then counted for ^{14}C. The log (P) values plotted against both molecular weights and % dose biliary excretion in rats showed high correlations, as did the extent of biliary excretion against the relative lipid solubility of the compounds, whether mono- or diquaternary, cation or anion. In general, those compounds with log (P) values of -2 or less were poorly excreted in the bile while those with values greater than -2 were more extensively excreted. These results suggest that the lipid solubility of polar organic cations and anions may be an important physicochemical factor in determining the extent to which they are eliminated in the bile. This implies that a certain balance between hydrophilic and hydrophobic properties (amphiphilicity) is required before a compound can cross liver cell membranes and enter bile.

5127 ACTIVATION OF ETHANOL UTILIZATION IN PERFUSED LIVER FROM NORMAL AND ETHANOL-PRETREATED RATS. THE EFFECT OF HYDROGEN PEROXIDE GENERATING SUBSTRATES.

(E.) Thurman, R. G.; McKenna, W. (Johnson Res. Fdn., Univ. Pennsylvania, Philadelphia). *Hoppe Seylers Z. Physiol. Chem.* 355 (3):336-340, 1974.

Hydrogen peroxide generating substrates such as glycolate (15 mM) or urate (0.5 mM) activated ethanol utilization by perfused rat livers from normal and ethanol-pretreated rats 2 to 3-fold above control rates in the presence of an inhibitor of alcohol dehydrogenase, 4-methylpyrazole. This stimulation of ethanol utilization was due to intraperoxisomal hydrogen peroxide generation, which led to the formation of catalase-H_2O_2. Concomitant with the elevated rate of ethanol utilization, the (lactate)/(pyruvate) ratio and (3-hydroxybutyrate)/(acetoacetate) ratio as indicators of the pyridine nucleotide redox state remained well oxidized. Thus, a combination of 4-methylpyrazole plus an H_2O_2-generating substrate could elevate the rate of ethanol metabolism, while simultaneously obviating the effects of an elevated pyridine nucleotide redox state.

5128 EVIDENCE FOR A ROLE OF THE MICROTUBULAR SYSTEM IN THE SECRETION OF NEWLY SYNTHESIZED ALBUMIN AND OTHER PROTEINS BY THE LIVER.

(E.) LeMarchand, Y.; Patzelt, C.; Assimacopoulos-Jeannet, F.; Loten, E. G.; Jeanrenaud, B. (Geneva Univ. Med. Sch., Switzerland). *J. Clin. Invest.* 53(6):1512-1517, 1974.

The interference with the integrity of liver microtubules by vinblastine, vincristine, or colchicine was studied in perfused livers (*in situ*) of 6-week-old male Swiss mice, and the secretion of albumin and protein was measured. After a lag period of 30 min, the release of newly synthesized proteins (with labeled amino acids) by control livers was linear for 90 min. When livers were perfused in the presence of vinblastine (100 μM), the secretion of labeled proteins was completely abolished, but there was no inhibition of total (i.e. hepatic plus perfusate) amino acid incorporation into proteins. Vinblastine also markedly affected lipid metabolism, i.e., triglyceride secretion was nearly abolished at a time when hepatic lipogenesis and triglyceride content were increased. In addition, this compound greatly inhibited ketone body production and somewhat decreased urea production. Newly synthesized protein secretion was noticeably inhibited (75%) by vincristine (2.5 μM). Cellular ATP content, glucose production, and fatty acid uptake were not modified by this drug. When livers were perfused with colchicine (10 μM), there was a 75% reduction in the appearance of labeled proteins in the perfusate. Total amino acid incorporation into proteins was not altered by either colchicine or vincristine, whereas hepatic amino acid incorporation into proteins was significantly higher in both vincristine and colchicine-treated livers than in control livers. More than 50% of the newly synthesized albumin was secreted into the perfusate of control livers. In the presence of vincristine or colchicine, the amount of newly synthesized albumin in the perfusate was drastically reduced, and the accumulation of labeled albumin within the liver was obvious although total albumin synthesis remained unchanged. Chromatographic separation of the various secreted proteins showed vincristine and colchicine decreased release of albumin, globulins, and small polypeptides to a similar extent. It is possible that variations in the hepatic microtubular system may play a more important role in the physiologic regulation (and perhaps also in the pathology) of albumin and globulin secretion than has previously been suspected.

5129 BILIARY EXCRETION OF PHENOL RED IN WISTAR AND GUNN RATS. *(E.)* Homan, E. R.; Guarino, A. M. (Lab. Toxicol., Natl. Cancer Inst., Bethesda, Md.). *Proc. Soc. Exp. Biol. Med.* 146(1):46-49, 1974.

Biliary excretion of phenol red and of phenol red glucuronide was studied in male Gunn and normal Wistar rats. Although phenol red is normally excreted by the kidneys, it may appear in rat bile as a free compound or as a glucuronide conjugate. For this investigation, both Gunn and Wistar rats had renal pedicle ligation. In Gunn rats, direct reacting bilirubin levels were twice those of Wistar rats while total bilirubin levels were approximately 15 times higher. The amount of free phenol red excreted in the bile was about the same in the 2 strains of rats, but Wistar rats excreted 32 to 35% of the phenol red as a glucuronide whereas only free phenol red was found in Gunn rat bile. Bile/plasma and bile/liver concentration ratios of free phenol red in Wistar rats were higher than those in Gunn animals. The phenol red exhibited a mild choleretic effect in both strains.

5130 ENHANCEMENT OF MICROSOMAL DRUG HYDROXYLATION AND GLUCURONIDATION IN RAT LIVER BY PHENOBARBITAL AND 3-METHYLCHOLANTHRENE IN COMBINATION. *(E.)* Vaino, H.; Aitio, A. (Dept. Physiol., Univ. Turku, Finland). *Acta Pharmacol. Toxicol.* 34:130-140, 1974.

Both 3-methylcholanthrene and phenobarbital increased the O-demethylation of *p*-nitroanisole in male Wistar rat liver microsomes (9-fold and 6-fold, resp.), whereas 3-methylcholanthrene alone was able to enhance the aryl hydrocarbon hydroxylase activity 13-fold. When the inducers were administered to rats in combination, the enhancement in O-demethylase activity of *p*-nitroanisole was greater and of aryl hydrocarbon hydroxylase was smaller than when administered singly. Both 3-methylcholanthrene and phenobarbital also enhanced the microsomal UDP glucuronyltransferase activity when measured after *in vitro* activation of the latent enzyme. The hepatic UDP glucuronyltransferase activity was increased about 2-fold after 3-methylcholanthrene pretreatment of rats as measured from the nonactivated microsomes. The pretreatment of rats with 3-methylcholanthrene and phenobarbital brought about no additional effect, when calculated on a microsomal protein basis. If calculated on 100 gram body weight basis, however, an additive effect was observed in UDP glucuronyltransferase activity due to the effects of the inducers on the liver weight/body weight ratio.

5131 EARLY CHANGES IN BILE COMPOSITION AND GALLSTONE FORMATION INDUCED BY A HIGH CHOLESTEROL DIET IN PRAIRIE DOGS. *(E.)* DenBesten, L.; Safaie-Shirazi, S.; Connor, W. E.; Bell, S. (Univ. Iowa Coll. Med., Iowa City). *Gastroenterology* 66(5):1036-1045, 1974.

Changes in the composition of hepatic and gallbladder bile during the early phases of gallstone formation were studied in adult male prairie dogs which were fed a cholesterol-free diet or 1.2% high cholesterol diet containing 41% of calories as egg yolk fat. Essential fatty acids constituted 2.2% of the total calories in the control diet and 3.28% in the lithogenic diet. Paired groups of animals fed the high and low cholesterol diets were killed 36 hr, 5 days, and 14 days after the diets were begun. After 36 hr, the serum cholesterol level was 427 mg/dl in animals fed the high cholesterol diet, and 143 mg/dl in the low cholesterol diet group. The liver cholesterol levels were 6.97 mg/g tissue in the cholesterol-free rats after 36 hr and 15.29 in the high cholesterol animals. After 5 days, the respective values were 8.40 and 16.78; after 14 days, 9.82 and 17.48. The bile cholesterol concentration was greater in cholesterol-fed animals (5.2 vs. 2.2, expressed as a percentage of total moles of cholesterol, phospholipid, and bile acid). Cholesterol-fed animals had a higher mole fraction of phospholipid (9.7 vs. 7.0) but the total bile acid fraction was less (85.0 vs. 90.8). Groups of animals killed at 5 and 14 days had further differences in the relative cholesterol concentrations in bile; concentrations of phospholipid and total bile acids also differed significantly from those measured in paired animals fed a low cholesterol diet. With the high cholesterol, egg yolk diet, the predominant bile acid in fresh gallbladder and hepatic bile shifted from cholic acid to chenodeoxycholic acid. Cholesterol crystals were found in the gallbladder bile of all high cholesterol-fed animals at 5 days; gallstones were present in 5 of 7 of these prairie dogs at 14 days. Dietary cholesterol overload in this animal model produced early supersaturation of cholesterol in bile, with subsequent cholesterol precipitation and gallstone formation.

5132 EFFECT OF BILE ACIDS ON CHOLESTEROL SYNTHESIS IN PERFUSED RAT LIVER. *(Ger.)* Barth, C.; Liersch, M.; Hackenschmidt, J.; Ullmann, J.; Decker, K. (Biochem. Inst., Univ. Freiburg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1373-1375, 1972.

Experiments on perfused rat livers showed that cholic and taurocholic acids in the enterohepatic circulation do not cause short-term inhibition of cholesterol or fatty acid synthesis. Taurocholic acid (10 mg/100 g/hr) was infused for 1 hr into the portal vein of rats which had been fed a diet containing 2% cholestyramine for 7 days. Infusion was followed by two 40 min periods during which bile acid was discontinued, the last period corresponding to interruption of the enterohepatic circulation and serving as a control period. Measurements of 1-^{14}C-labeled acetate incorporation revealed that no change had occurred in the rate of hepatic cholesterol or fatty acid synthesis. Infusion of taurocholic acid for 3 had no effect on the synthesis rate or redox tatus of ketone bodies or on the activities of LDH, lutamate-oxaloacetate transaminase, or glutamate- yruvate transaminase in the perfusion medium. No oxic effect on mitochondrial function or on the iver cell membrane was observed. Within 40 min after iscontinuing 1 hr of taurocholate infusion, 95% of he bile acid administered had been excreted again in he bile. Since about 1/3 of the cholic acid in ortal vein blood is present in the nonconjugated orm, this experiment was repeated with free cholic cid (dose unspecified) which likewise had no effect n hepatic cholesterol or fatty acid synthesis. hese findings do not rule out the possibility that ile acids may inhibit hydroxymethylglutaryl-CoA eductase *in vivo*.

133 DEPLETION OF BRAIN NOREPINEPHRINE IN ACUTE HEPATIC COMA.

(E.) Dodsworth, J. M.; ames, J. H.; Cummings, M. C.; Fischer, J. E. (Dept. urg., Harvard Med. Sch., Boston, Mass.). *Surgery* 5(6):811-820, 1974.

he time course of accumulation of the neurotrans- itter norepinephrine and the false neurotransmitter ctopamine was measured in brains of female Sprague awley rats with acute hepatic coma induced by porta- aval anastomosis, followed, 48 hr later, by hepatic rtery ligation. Results were compared to those ob- ained on a variety of controls which had undergone epatic artery ligation, acute portacaval shunt, and ham operation. Brain octopamine levels did not iffer significantly between sham-operated animals nd normal unoperated animals. Following hepatic rtery ligation, some decrease in brain octopamine as seen, but an increase occurred 48 hr after acute hunt. However, if hepatic artery ligation was per- ormed on an already shunted animal, the brain octo- amine increased approximately 300 to 400% above levels seen in hepatic artery ligation alone. Heart ctopamine increased markedly after 6 hr of acute hepatic coma and then rose gradually until the animals were moribund. Brain norepinephrine did not differ significantly between normal rats, sham-operated animals, rats with hepatic artery ligation alone, and animals with acute portacaval shunt alone. When the rats became symptomatic at 6 hr, brain norepinephrine decreased, reaching a final depletion of approximately 50% in the moribund stage. In animals injected with ^{3}H-d,l-norepinephrine, no difference occurred in initial uptake or turnover whether expressed in terms of turnover or specific activity. In those injected with ^{3}H-l-norepinephrine, uptake was greater in the brains of animals in coma. The results suggest that synthesis of norepinephrine is decreased in acute hepatic coma, but much more research is required to determine whether this diminution is caused by displacement, decreased synthesis, or other factors.

5134 INSULIN AS THE PRIMARY FACTOR GOVERNING CHANGES IN MITOCHONDRIAL METABOLISM LEADING TO LIVER REGENERATION AND ATROPHY.

(E.) Ozawa, K.; Yamaoka, Y.; Nanbu, H.; Honjo, I. (Kyoto Univ. Fac. Med., Japan). *Am. J. Surg.* 127(6):669-675, 1974.

In this study investigating factors in hepatic regeneration, ligation of the left branch of the portal vein in male rabbits for 24 hr resulted in decreased phosphorylation rates of mitochondria of liver cells from the ligated lobe with glutamate substrate in the isolating medium, and a marked rate increase in mitochondria from cells of the unligated lobe. However, when 5 g liver slices from the ligated lobe were incubated in a medium containing crystalline insulin (13 μg/ml) for 10 minutes, the respiratory control ratio, state 3 respiration, P:O ratio, and phosphorylative activity of the mitochondria, depressed by portal deprivation, increased to greater levels with glutamate substrate than with succinate, nearly equalling those of mitochondria from the unligated lobe. A more marked enhancement was observed with NAD-linked substrates than with succinate, as seen in mitochondria from the unligated lobe. The addition of glucagon to the incubation mixture did not appreciably enhance the mitochondrial phosphorylative activity of liver slices from the ligated lobe. These findings suggest that insulin may play an important regulatory role in possibly activating some portal factor which may trigger enhanced oxidative phosphorylation of liver mitochondria, such an increase being requisite for later rise in nuclear DNA leading to greater liver regeneration.

5135 SITES OF COMPETITION IN THE SELECTIVE HEPATIC UPTAKE OF RIFAMYCIN-SV, FLAVASPIDIC ACID, BILIRUBIN AND BROMSULPHTHALEIN.

(E.) Kenwright, S.; Levi, A. J. (Clin. Res. Ctr., Harrow, England). *Gut* 15(3):220-226, 1974.

The effect of rifamycin-SV (3.6 μM/100 g) and flavaspidic acid (5 μM/100 g) on the hepatic uptake of BSP (6 μM/100 g) was measured *in vivo* in Sprague-Dawley rats and was compared with the ability of these drugs to displace BSP from ligandin and Z protein *in vitro*. The effect of rifamycin-SV on the distribution of bilirubin in the liver cell and its subfractions was also investigated *in vitro* in homozygous Gunn rats to determine whether this drug could selectively displace bilirubin from ligandin or Z protein. Both rifamycin-SV and flavaspidic acid impaired uptake of BSP *in vivo*, whether given 10, 30, or 60 min before BSP. In contrast to rifamycin-SV, which had little effect on the binding of BSP to ligandin and Z protein, flavaspidic acid, when present in only 1/10 of the molar concentration of BSP, displaced more than half of the BSP from Z protein. However, flavaspidic acid displaced BSP from ligandin only when the drug was added in a 10-fold molar excess. With low concentrations of flavaspidic acid, binding of BSP to ligandin increased slightly. Rifamycin-SV increased serum bilirubin concentrations over control levels and reduced bilirubin levels in total liver, supernatant, pellet, ligandin, and Z protein to about the same extent, while flavaspidic acid increased pellet bilirubin levels and displaced bilirubin primarily from Z protein. These findings suggest that flavaspidic acid primarily affects bilirubin uptake by competition for binding to Z protein, but that rifamycin-SV competes at an earlier step, perhaps at the plasma membrane level. Addition of rifamycin-SV to Gunn rat liver supernatant in concentrations similar to those found in the *in* *vivo* experiments and at more than twice the molar concentration of bilirubin, reduced bilirubin bound to the Z fraction to 80% of control values and slightly increased bilirubin binding to ligandin and the X fraction. Thus, rifamycin-SV causes gross impairment of BSP uptake *in vivo* but does not displace BSP from ligandin or Z protein *in vitro*. This suggests that the uptake defect is not likely to be due to competition for binding to these proteins.

5136 NEONATAL CHANGES IN THE CONCENTRATION OF RAT LIVER CYCLIC AMP AND OF SERUM GLUCOSE, FREE FATTY ACIDS, INSULIN, PANCREATIC, AND TOTAL GLUCAGON IN MAN AND IN THE RAT. *(E.)*

Blazquez, E.; Sugase, T.; Blazquez, M.; Foa, P. P. (Sinai Hosp. Detroit, Mich.). *J. Lab. Clin. Med.* 83(6):957-967, 1974.

Changes occurring in serum insulin and glucagon were investigated during the first 24 hr of life in human babies and spontaneously delivered Wistar rats and from days 19-22 of gestation in fetal Wistar rats. Changes in serum glucose and free fatty acid levels were studied and, in the rat, the activity of cyclic AMP in the liver. In both rats and humans, prenatal anabolic processes are reversed during the transition from placental to oral nutrition, partly due to inhibition of insulin and stimulation of glucagon secretion. In human neonates, serum glucose and insulin decreased 1 hr after birth and remained low during the first day. Serum free fatty acids and serum pancreatic glucagon levels increased 3 hr after delivery and remained elevated for the rest of the day. Serum glucagon-like immunoreactivity represented mostly serum pancreatic glucagon until 24 hr after birth. By that time the babies had received their first feeding. On day 21 of gestation, serum glucose levels were equal in fetal rats and in their mothers. On day 22, fetal glucose levels were higher, but decreases occurred immediately after birth. Serum pancreatic glucagon remained the same during the last few days of gestation in fetal rats, but increased significantly 15 min after birth; reached a maximum 3 hr after birth, and remained elevated during the first day. No changes occurred in fetal serum free fatty acids during gestation, but levels increased on days 19-21 of gestation and decreased on day 22. Hepatic cyclic AMP increased in fetal rats during days 19-22 of gestation. Serum nonpancreatic glucagon immunoreactivity decreased after birth but increased with the onset of nursing.

5137 SINUSOIDAL STENOSIS AS THE CAUSE OF PORTAL HYPERTENSION IN CHOLINE DEFICIENT DIET INDUCED FATTY CIRRHOSIS OF THE RAT LIVER. *(E.)*

Wada, K.; Fujimoto, K.; Fujikawa, Y.; Shibayama, Y.; Mitsui, H.; Nakata, K. (Osaka Med. Coll., Japan). *Acta Pathol. Jap.* 24(2):207-217, 1974.

Results demonstrated by Donryu strain male rats fed a choline deficient diet were used to investigate a possible anatomical lesion responsible for portal hypertension. Portal vein pressures, hemodynamic analysis of isolated perfused livers, diameter measurement of intrahepatic vascular trees, histological, and histometrical examinations were used in this investigation. The mean portal vein pressure was elevated from 132 to 175 mm H_2O in fatty liver, to 179 in fatty liver with fibrosis, and to 218 in fatty cirrhosis of liver. The hepatic blood flow of the isolated perfused rat liver (pressure 135 mm H_2O) decreased from the normal level, 3.0 ml/g/min to 1.2 ml/g/min in fatty liver, to 0.4 in fatty liver with fibrosis and to 0.7 in fatty cirrhosis of liver. There was no abnormality in the pre- and post-sinusoid vessel, but the sinoidal space was diminished due to enlargement of the hepatic cells. There was a significant correlation between portal hypertension and sinusoidal space decrease. Connective tissue proliferation did not affect increase in hepatic vascular resistance. These findings demonstrate that the reduction of sinusoidal space was the anatomical lesion related to the development of portal hypertension in choline-deficient-diet induced fatty liver as well as fatty cirrhosis of the liver (sinusoidal hypertension)

5138 THE EFFECTS OF VARYING IONIC COMPOSITION OF THE PERFUSATE ON LIVER MEMBRANE POTENTIAL, GLUCONEOGENESIS AND CYCLIC AMP RESPONSES. *(E.)*

Dambach, G.; Friedmann, N. (Univ. Pennsylvania Sch. Med., Philadelphia). *Biochim. Biophys. Acta* 332(3):374-386, 1974.

The hyperglycemic effects of glucagon and cyclic AMP on redistribution of cellular ions and on membrane hyperpolarization were investigated. Livers of male Sprague-Dawley rats was perfused *in situ* with Krebs-Ringer bicarbonate buffer. Glucagon or cyclic AMP administration resulted in an increased glucose production, hyperpolarization of the liver cells, and a large efflux of intracellular Na^+. Total substitution of perfusate Na^+ with either Li^+ or choline lowered the membrane potential and resulted in an inhibition of the cyclic AMP-stimulated Na^+ efflux, membrane hyperpolarization, and glucose production, but did not block the cyclic AMP-stimulated Ca^{2+} efflux. With partial replacement of Na^+ by either Li^+ or choline, the responses to the cyclic nucleotides were normal. Partial substitution of Na^+ by 100 mM K^+ caused a depolarization of the liver cells, and responses to cyclic AMP under this condition were greatly reduced. Substitution of the extracellular Cl^- with isethionate did not inhibit these effects of cyclic AMP. These data are consistent with studies indicating that a functional connection might exist between the hormone- or cyclic AMP-induced ion fluxes, cell membrane hyperpolarization, and the metabolic effects evoked by these agents.

5139 PLASMA AMINO ACIDS IN EXPERIMENTAL ACUTE HEPATIC FAILURE AND THEIR RELATIONSHIP TO BRAIN TRYPTOPHAN. *(E.)*

Buxton, B. H.; Steward, D. A.; Murray-Lyon, I. M.; Curzon, G.; Williams, R. (Kings Coll. Hosp., London, England). *Clin. Sci. Mol. Med.* 46(4):559-562, 1974.

Eight large white pigs were fasted overnight and subjected to acute devascularization of the liver by portacaval anastomosis, followed by hepatic artery ligation. Blood samples were taken from the carotid artery at 2 hr intervals and the concentrations of 15 plasma amino acids were determined. After devascularization, the mean glycine, alanine, and methionine values increased significantly. Smaller rises in the concentrations of most of the other 12 amino acids measured were not statistically significant. The levels of tyrosine and phenylalanine in the cerebrospinal fluid also increased significantly following devascularization, while the concentration of arginine decreased. Altered plasma concentrations of 5 neutral amino acids (tyrosine, phenylalanine, leucine, isoleucine, valine) which compete with tryptophan for transport into the brain had no apparent influence on the brain tryptophan concentrations.

5140 EFFECT OF PROSTAGLANDIN E_1 ON HEPATIC CYCLIC AMP ACTIVITY, CARBOHYDRATE AND LIPID METABOLISM. *(E.)* Levine, R. A. (Upstate Med. Ctr., Syracuse, N.Y.). *Prostaglandins* 6(6):509-521, 1974.

Prostaglandin E_1 (PGE_1) failed to stimulate rat liver cyclic AMP (cAMP), induce hyperglycemia, glycogenolysis or lipolysis or prevent epinephrine-induced hyperglycemia in isolated perfused rat liver, even though other known glycogenolytic agents (glucagon and epinephrine) activated cAMP in this same system. The data do not support a physiologic role for PGE_1 on hepatic glycogenolysis or lipolysis. Although the effects of PGE_1 on gluconeogenesis, lipogenesis, ureogenesis or amino acid transport in isolated perfused liver were not investigated, if PGE_1 is subsequently found to influence these metabolic parameters, such alterations would probably occur independent of a change in cAMP activity.

5141 EXPERIMENTAL THYROXINE-INDUCED LIVER DISEASE. *(Sp.)* Rios Mozo, M.; Gonzalez Vilchez, J. (Fac. Med., Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 42(4):395-414, 1974.

5142 QUANTITATIVE AND QUALITATIVE CHANGE IN CYTOCHROME P_{450} IN CHOLESTATIC RATS. *(E.)* Mackinnon, A. M.; Sutherland, E.; Simon, F. R. (Univ. Colorado Med. Ctr., Denver). *Gastroenterology* 66(4):735, 1974.

5143 SATURATION KINETICS OF IOPANOIC ACID IN DOGS: A SIMPLIFIED TECHNIQUE FOR DETERMINATION OF HEPATIC TRANSPORT MAXIMUM. *(E.)* Nelson, J. A.; Staubus, A. E. (VA Hosp., San Francisco, Calif.). *Gastroenterology* 66(4):753, 1974.

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5146 LIVER ALKALINE PHOSPHATASE: ITS FUNCTION IN HEPATIC VITAMIN B_6 METABOLISM. *(E.)* Lumeng, L.; Li, T. K. (Indiana Univ. Sch. Med., Indianapolis). *Gastroenterology* 66(4):853, 1974.

5147 RECIRCULATION AND METABOLISM OF MICELLAR BILE LECITHIN. *(E.)* Robins, S. J.; Turner, F. C. (VA Hosp., Boston, Mass.). *Gastroenterology* 66(4):862, 1974.

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5152 A MORPHOLOGIC STUDY OF GALLSTONE DEVELOPMENT IN THE SQUIRREL MONKEY. *(E.)* Osuga, T.; Portman, O. W.; Mitamura, K.; Alexander, M. (Univ. Tokyo Sch. Med., Japan). *Lab. Invest.* 30(4):486-493, 1974.

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RAT. *(E.)* Stein, L.; Mishkin, S.; Arias, I. M. (Albert Einstein Coll. Med., New York, N.Y.). *Gastroenterology* 66(4):895, 1974.

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5171 RELEASE OF β-HYDROXYLATED PHENYLETHYLAMINE FALSE NEUROCHEMICAL TRANSMITTERS BY L-DOPA. *(E.)* James, J. H.; Fischer, J. E. (Massachusetts Gen. Hosp., Boston). *Gastroenterology* 66(4):887, 1974.

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5180 DERANGEMENT OF VITAMIN B_6 METABOLISM WITH ETHANOL: A DIRECT DEMONSTRATION IN ISOLATED PERFUSED LIVERS. *(E.)* Veitch, R. L.; Lumeng, L.; Li, T. K. (no affil.). *J. Clin. Invest.* 53(6):82a, 1974.

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See also, 4978, 4979, 4981, 4994, 4995, 5016, 5290, 5307, 5309, 5312, 5355.

SECRETION AND METABOLISM

Intestine

5279 CONTROL OF INTESTINAL EPITHELIAL REPLACEMENT: LACK OF EVIDENCE FOR A TISSUE-SPECIFIC BLOOD-BORNE FACTOR. *(E.)* Clarke, R. M. (Univ. Nottingham Med. Sch., England). *Cell Tissue Kinet.* 7(3):241-250, 1974.

To investigate the possible role of systemic or local factors in the control of the presently unknown mechanism of small intestine epithelial regeneration, the small intestines of 38 male albino Wistar rats were transected in 2 places, (1) about 14% and (2) about 50% of the length from the pylorus. *In situ* continuity was re-established by suturing the proximal and distal ends. The excised small intestine segment, averaging 36% of the total length, had one end (proximal) closed off, and the other end (distal) sutured either to the *in situ* intestine forming an intestine-sac, or to the peritoneal lining of the abdominal wall, producing a skin-sac. There were no signicant differences among the groups in villus height, crypt depth, or crypt/villus ratio. On the 9th postoperative day, the cell production rate in squashes of micro-dissected whole crypts of Lieberkuhn was measured by mitotic blockade with demecolcine. The rate f cell production in unoperated and sham-operated ats was 30 cells/crypt/hr throughout the length of he small intestine. For the intestine *in situ*, the ate increased to an average of 46 cells/crypt/hr bove the anastomosis and to 54 cells/crypt/hr below t. At the blind end of the intestine-sac, the rate as 39 cells/crypt/hr, while at the blind end of the ac attached to the abdominal lining, the rate of ell production was only 16 cells/crypt/hr. This significantly lower cell production rate in the ntestine segment which was not in contact with ngesta is taken to be evidence of the importance of ocal, rather than systemic, blood-borne factors in he control of epithelial replacement.

5280 THE INFLUENCE OF VARIOUS CELL KINETIC CONDITIONS ON FUNCTIONAL DIFFERENTIATION IN HE SMALL INTESTINE OF THE RAT. A STUDY OF ENZYMES BOUND TO SUBCELLULAR ORGANELLES. *(E.)* De Both, N.J. an Dongen, J. M.; Van Hofwegen, B.; Keulemans, J.; isser, W. J.; Galjaard, H. (Erasmus Univ., Rotterdam, Netherlands). *Dev. Biol.* 38(1):119-137, 1974.

Maturation and aging of absorptive epithelial cells were investigated in isolated duodenal segments from Glaxo-Wistar rats. Cell kinetic data show that the epithelial cells originate in the lower half of the crypt and differentiate in about 10-12 hr in the upper half of the crypt. As functional absorptive cells they migrate to the top of the villi during 36 hr in normal rats and 48 hr in germfree rats. Activity of alkaline phosphatase, measured as a marker for microvilli, is absent in the crypt but increases linearly from the base of the villus to the tip. Nonspecific esterases, mainly localized in the endoplasmic reticulum, show increasing activity during cell maturation in the crypt and subsequent migration along the lower half of the villus; no further increase in activity occurs when the cell moves along the upper half of the villus. The longer life-span of villus cells in germfree Glaxo-Wistar rats does not result in higher esterase or alkaline phosphatase activity. An increased proliferative activity in the crypt, as present 72 hr after irradiation with 400 r, is accompanied by decreased esterase and alkaline phosphatase activity. The specific activity of enzymes bound to mitocondria or lysosomes (monamine-oxidase and β-N-acetylglucosaminidase, resp.) is not affected by changing crypt cell kinetics. Electrophoretic analyses of isolated cell compartments showed that the increase in esterase activity during normal differentiation and the decrease occurring after x-irradiation are due to changes in overall activity, not to the appearance or disappearance of specific isoenzymes. Electron microscopy showed gradual development of ultrastructural features during cell migration along the crypt, with drastic changes in structure occurring at the moment the cell enters the villus. Ultrastructural development was not influenced by increased proliferative activity in the crypt 72 hr after irradiation. Therefore, the decrease in enzyme activity is not related to ultrastructural changes.

5281 KINETIC EVIDENCE FOR THE PRESENCE OF TWO PROSTAGLANDIN RECEPTOR SITES REGULATING THE ACTIVITY OF INTESTINAL ADENYLATE CYCLASE SENSITIVE TO ENTEROTOXIN. *(E.)* Kantor, H. S.; Tao, P.; Kiefer, H. C. (Cook County Hosp., Chicago, Ill.). *Proc. Nat. Acad. Sci.* 71(4):1317-1321, 1974.

Kinetic behavior consistent with the presence of 2 independent, but simultaneously acting, regulatory effector sites for prostaglandins is presented for adenylate cyclase of rabbit intestinal epithelial cells. One site regulates activation of the catalytic site, while the other site regulates inhibition. A synthetic prostaglandin analogue, 7-oxa-13-prostynoic acid, is recognized at both sites in a concentration-dependent manner. At concentrations of 7-oxa-13-prostynoic acid less than 45 μg/ml, activation is seen, while at higher concentrations, inhibition occurs. Different naturally occurring prostaglandins appear to be site-specific. Prostaglandin E_1 gives only activation of the cyclase, while prostaglandin A_1 gives only inhibition of the activated cyclase. When saturating concentrations of prostaglandin E_1 are used to activate adenylate cyclase, no further activation by 7-oxa-13-prostynoic acid can be elicited, indicating that both molecules activate at the same site. The similarity of inhibition constants for both 7-oxa-13-prostynoic acid and prostaglandin A_1 suggests that the mode of binding is the same for both compounds and that they probably inhibit by acting at the same site. The inhibition by 7-oxa-13-prostynoic acid and by prostaglandin A_1 overrides enzyme activation produced by either *Escherichia coli* enterotoxin, prostaglandin E_1, or sodium fluoride, suggesting that in intestinal adenylate cyclase this site is the primary regulatory site for enzyme activity. These data suggest that sites exist on adenylate cyclase which would allow prostaglandins to serve as the intracellular messengers by which the cell controls its adenylate-cyclase-mediated response to extracellular stimulation, as with hormones.

5282 CORRELATIONS BETWEEN IONIC CONTENTS IN DIFFERENT REGIONS AND LAYERS OF INTESTINAL MUSCLE. *(E.)* Job, D. D.; Bloomquist, W. E. (Eli Lilly Co., Indianapolis, Ind.). *Am. J. Physiol.* 226(6):1496-1501, 1974.

In a systematic study of the ion content of cat intestinal muscle, different regions of the small intestine were compared and differences were also sought in the ion content of the two muscle layers. Entire intestinal tracts of cats of heterogeneous background and breed were excised, and segments from duodenum (1), jejunum (2), and ileum (2) were analyzed as to ion content of the circular and longitudinal muscle layers and of the 5 regions selected. Only sodium ions exhibited a statistically significant gradient down the intestine, with the ileum having a lower content than the duodenum. This gradient was present in both muscle layers separately and in combination with each other. Calcium was also significantly lower in the ileum than in the duodenum, but it did not decrease in a linear fashion and the difference was prevalent only in the longitudinal layer. In general, the longitudinal layer was higher in sodium, chloride, and calcium than the circular layer. Correlation coefficients computed for the various ions showed that sodium and calcium were significantly correlated; this is in keeping with current concepts of excitable membranes. Sodium and potassium, however, were less highly correlated. The finding of a high correlation between potassium and magnesium suggests a new relationship. The mechanisms involved in the differences of electrolyte concentrations and of interactions in the longitudinal and circular muscle layers as well as in the different regions for each layer remain obscure. Classical ionic mechanisms such as the one-for-one exchange of sodium and potassium and the sodium and calcium competition are not sufficient to explain all the correlations.

5283 ANALYSES OF LIPID FRACTIONS FROM THE SMALL INTESTINE OF THE CHICK EMBRYO. *(It.)* Antonucci, A.; Cocco, L.; Pallotta, R. (Inst. Gen. Histol. Embryol. Normal Human Anat., Univ. Chieti, Italy). *Boll. Sper. Ital. Biol. Sper.* 45(12): 715-720, 1973.

5284 MEMBRANE PROTEIN CHANGES DURING INDUCTION OF INTESTINAL DISACCHARIDASES IN SUCKLING RATS. *(E.)* Forstner, G.; Galand, G. (Toronto Western Hosp., Canada). *Gastroenterology* 66(4):693, 1974.

5285 INTESTINAL HORMONAL CONTROL OF TRYPSIN FORMATION. *(E.)* Goetze, H.; Adelson, J. W.; Hadorn, H. B. (Dept. Pediatr., Univ. Bern, Switzerland). *Gastroenterology* 66(4):701, 1974.

5286 COMPARATIVE EFFECTS OF TOTAL PARENTERAL NUTRITION, ORAL FEEDING AND STARVATION ON RAT SMALL INTESTINE. *(E.)* Heird, W. C.; Tsang, H. L.; MacMillan, R.; Kaplan, R.; Rosensweig, N. S. (Columbia Univ. Coll. Physicians Surg., New York, N.Y.) *Gastroenterology* 66(4):709, 1974.

5287 JEJUNAL ENZYME ACTIVITIES IN RATS AFTER ACUTE ETHANOL TREATMENT. *(E.)* Rodgers, J. B.; O'Brien, R. J. (Albany Med. Coll., N.Y.). *Gastroenterology* 66(4):766, 1974.

5288 DIURNAL RHYTHMS OF INTESTINAL ENZYMES AND TRANSPORT SYSTEMS IN THE RAT AND THE EFFECT OF RESTRICTED FEEDING ON THESE RHYTHMS. *(E.)* Stevenson, N. R.; Fierstein, J. S. (Rutgers Med. Sch., Piscataway, N.J.). *Gastroenterology* 66(4):784, 1974.

5289 INTESTINAL TRYPTOPHAN AND PHENYLALANINE HYDROXYLASES IN THE RAT SMALL INTESTINE: IDENTITY, LOCALIZATION AND BIOCHEMICAL PROPERTIES. *(E.)* Wapnir, R. A. (North Shore Univ. Hosp., Manhasset, N.Y.). *Gastroenterology* 66(4):794, 1974.

5290 INFLUENCE OF BILIARY STASIS ON ENTEROKINASE ACTIVITY IN THE RAT. *(E.)* Morin, C. L.; Ling, V.; Deschenes, N. (St. Justine Hosp., Montreal, Canada). *Gastroenterology* 66(4):801, 1974.

5291 ACTIVE TRANSPORT (SECRETION) OF IRON BY RAT JEJUNUM: A NEW MECHANISM OF IRON EXCRETION. *(E.)* Guy, M. J.; Schachter, D. (Columbia Univ. Coll. Physicians Surg., New York, N.Y.). *Gastroenterology* 66(4):842, 1974.

5292 NA-K-ATPASE IN ISOLATED INTESTINAL VILLUS TIP AND CRYPT CELLS. *(E.)* Charney, A. N.; Gots, R.; Giannella, R. (Walter Reed Inst. Res., Washington, D.C.). *Gastroenterology* 66(4):673, 1974.

5293 VASOACTIVE INTESTINAL PEPTIDE (VIP) STIMULATION OF ADENYLATE CYCLASE AND ACTIVE ELECTROLYTE SECRETION IN INTESTINAL MUCOSA: POSSIBLE ROLE IN THE PANCREATIC CHOLERA SYNDROME. *(E.)* Schwartz, C. J.; Kimberg, D. V.; Sheerin, H. E.; Field, M.; Said, S. I. (no affil.). *J. Clin. Invest.* 53(6):73a, 1974.

5294 THE IMPORTANCE OF ORAL INTAKE IN MAINTENANCE OF RAT SMALL INTESTINAL MASS, PROXIMAL-DISTAL GRADIENT (PDG), AND DISACCHARIDASE ACTIVITY. *(E.)* Levine, G.; Steiger, E.; Deren, J. J. (Philadelphia VA Hosp., Pa.). *Gastroenterology* 66(4):850, 1974.

5295 INTESTINAL GLYCOPROTEINS OF GERMFREE RATS. III. CHARACTERIZATION OF A WATER-SOLUBLE GLYCOPROTEIN FRACTION. *(E.)* Wold, J. K.; Midtvedt, T.; Jeanloz, R. W. (Inst. Pharm., Univ. Oslo, Norway). *Acta Chem. Scand.* [*B*] 28(3):277-284, 1974.

See also, 4973, 5011, 5019, 5031, 5039, 5098, 5306.

GENERAL

5296 HEPATIC PROTEIN BINDING OF FOLATE. *(E.)* Corrocher, R.; De Sandre, G.; Pacor, M. L.; Hoffbrand, A. V. (Inst. Med. Pathol., Trieste, Italy). *Clin. Sci. Mol. Med.* 46(4):551-554, 1974.

Binding of tritiated folic acid to liver cell cytoplasmic proteins of starved, male Wistar rats was studied *in vitro* and *in vivo* by Sephadex G75 column chromatography. *In vitro* studies revealed that folic acid is bound mainly in he Y and Z protein fractions, previously described s binding other organic anions, e.g., bilirubin r sulphobromophthalein. In the *in vivo* studies, t 10 min after injection of tritiated folic cid, radioactive folates in liver cytoplasm ere bound largely to X and Z protein fractions, ith a smaller fraction bound to the Y fraction. t 24 and 48 hr after injection, radioactive olates were bound largely to the X and Y protein ractions. The proportion of radioactive folate ound to the X fraction was greater *in vivo* than *n vitro*, and the proportion attached to Y and Z roteins was somewhat less. It is suggested that he Y and Z proteins or closely related proteins ay be involved in the transfer of folates from lasma to liver, the major store of folate in he body. It is suggested that competition etween folates and folate antagonists, for X, and Z proteins may be involved in the anti-olate action of the antagonists.

297 PRODUCTION AND PREVENTION OF FATTY LIVER IN RATS FED CLOFIBRATE AND OROTIC ACID DIETS ONTAINING SUCROSE. *(E.)* Novikoff, P. M.; Roheim, . S.; Novikoff, A. B.; Edelstein, D. (Albert Einstein oll. Med., Yeshiva Univ., Bronx, N.Y.). *Lab. nvest.* 30(6):732-750, 1974.

he prevention of fatty liver development by the simul-aneous administration of orotic acid and clofibrate, as investigated. Results of adding the agents to 6 iets fed to male Sprague-Dawley rats were determined y biochemical analysis of serum and hepatic lipids, mmunologic assays of plasma apoproteins, and morph-ologic studies of liver tissue. (I) Mild fatty liver as induced in the rats by feeding clofibrate as 0.25% f a high sucrose diet. While the liver triglyceride levels increased more than 2-fold, the plasma levels were lower than in either the high sucrose-fed or chow-fed controls. Examination of fine structure of the liver revealed that the smooth endoplasmic reticulum formed sheets or ribbons which were incompletely wrapped around lipid droplets and which were concentrated at the sinusoidal surfaces of all hepatocytes. It must be stressed that, as in control rats, the lipid accumulated outside the endoplasmic reticulum. Although the Golgi apparatus was normal, GERL (defined as a specialized region of endoplasmic reticulum [ER] and Golgi apparatus [G] where lysosomes [L] appeared) contained a great number of lipid particles in the process of degradation. A dramatic increase in peroxisome population was seen, as also in clofibrate addition to chow. (II) The addition of orotic acid as 1% of a high sucrose diet resulted in the development of very pronounced fatty livers. Hepatic triglyceride levels were about 9 times greater than normal by the 9th day, and about 20 times above normal by the 16th. Triglyceride levels in the plasma fell to less than 75% of control in 8 days, and at that time the apoprotein B component of plasma lipoproteins disappeared. Cytologically, the endoplasmic reticulum was broken into vesicles within which lipid accumulated. After 8 days, all signs of lipid transport via the endoplasmic reticulum and the Golgi apparatus to the space of Disse vanished. (III) When clofibrate and orotic acid were added to the diet simultaneously in the same proportions as indicated above, no fatty liver was produced. Liver triglyceride concentrations were lower than in sucrose controls until the 8th day; by the 16th day they reached sucrose control levels. Although plasma triglycerides were lowered, the total plasma apoprotein B remained at control levels. The relation of the endoplasmic reticulum to the Golgi apparatus was apparently normal, but GERL was more active in degrading lipids than in clofibrate-fed rats. The clofibrate effect on peroxisomes occurred even in the presence of orotic acid. As seen in these studies, it is not evident how clofibrate reverses the orotic acid development of fatty liver, but lipid particles move from the endoplasmic reticulum into the Golgi apparatus which secretes very low density lipoproteins into the plasma. Clofibrate also permits movement of lipid particles into GERL where it is catabolized, and this is consistent with the maintenance of normal levels of apoprotein B concentration in the plasma, as demonstrated in this investigation.

5298 INTERACTION OF SALICYLIC ACID WITH ADENOSINE AND ADENOSINE TRIPHOSPHATE: POTENTIAL MECHANISM OF INTENSIFYING ASPIRIN-INDUCED GI BLOOD LOSS. *(E.)* Sternson, L. A.; Coviello, D. A. (Univ. Illinois Med. Ctr., Chicago). *J. Pharm. Sci.* 63(6):966-968, 1974.

In this communication, results are reported on an investigation to establish a possible cause of aspirin-induced gastric or gastrointestinal bleeding, previously postulated as being due to either (1) local effect alone by contact of aspirin particles with the mucosa or (2) a combination of local and systemic effects. The latter was said to be due to the role of aspirin in reducing platelet aggregation through elimination of a 2nd wave of platelet accumulation induced by adenosine diphosphate. Results of this study revealed interaction between salicylic acid and adenosine or adenosine triphosphate to form complexes possessing greater surface activity. Because of this activity, reduction of platelet aggregation occurred, thus enhancing and prolonging the local effect. Spectrophotometric techniques were used to evaluate such formation of complexes at 296 nm in the presence of various concentrations of adenosine or adenosine triphosphate. The Benesi-Hildebrand equation yielded plots from which constants for the complex formations could be determined. Work is continuing to verify these findings and to investigate complex-formation with other adenine nucleotides.

5299 EFFECT OF GLUCAGON ON TOTAL BLOOD FLOW IN HEMORRHAGIC SHOCK. *(E.)* Darle, N.; Lim, Jr., R. C.; Blaisdell, F. W. (Univ. California Sch. Med., San Francisco). *Acta Chir. Scand.* 140(3): 217-225, 1974.

Since hemorrhage decreases the total liver blood flow and increases resistance to portal venous flow, this study was designed to investigate the effect of glucagon on total liver blood flow in hemorrhagic shock models using 13 adult mongrel dogs. When glucagon was given i.v. (50 μg/kg) 30 minutes after initiation of hemorrhagic shock, the total liver blood flow increased from 45 to 86 ml/min (95%) as measured by the Xenon-clearance method. Systemic arterial blood pressure levels, maintained close to 50 mm Hg, after hemorrhage remained unchanged in 1 dog; increased 5-20 mm Hg in 6; and decreased 2-10 mm Hg in 2 animals. The mean change in controls after administration of an equal volume of saline was a decrease from 51 to 50 mm Hg. A second 50 μg/kg i.v. injection of glucagon 2 hrs after shock increased total liver blood flow from 55 to 76 ml/min (46%) but the systemic arterial blood pressure showed a mean decrease from 53 to 50 mm Hg. The mean pressure was unchanged in the control group. Other parameters measured showed a significant increase in portal venous pressure after each glucagon administration; an increase in blood glucose after either glucagon or placebo injection; and a decrease in hematocrit in both groups during the study. The favorable effect of glucagon on total liver blood flow in hemorrhagic shock suggests that it may have a potential benefit on protecting the liver during shock. If this beneficial effect also occurs after correction of hypovolemia, the potential significance of glucagon therapy would be even greater. The observation in this study of a pronounced increase of total liver blood flow after transfusion of the glucagon-treated animals further indicates that there would be advantages to glucagon administration at the time of initiation of resuscitation, as the effects of transfusion might be augmented since splanchnic pooling should be lessened.

5300 BACTERIAL MICROFLORA OF THE UPPER GASTROINTESTINAL TRACT IN INFANTS WITHOUT DIARRHOEA. *(E.)* Challacombe, D. N.; Richardson, J. M.; Anderson, C. M. (Inst. Child Health, Univ. Birmingham, England). *Arch. Dis. Child.* 49(4):264-269, 1974.

A qualitative and quantitative study of the aerobic and anaerobic microflora of the upper gastrointestinal tract was undertaken in a group of 13 infants (5 girls and 8 boys, aged 2 weeks to 10 months). Bacteriological cultures from the nose and throat swabs showed a wide variety of organisms with coagulase-negative staphylococci appearing most frequently from nose cultures and *Streptococcus viridans* from the throat. Coliforms were present. Many of the nose and throat organisms were also isolated from the gastric juice. Coagulase-negative staphylococci, *Streptococcus viridans,* and coliforms were most frequently isolated. Duodenal juice showed marked bacteriological differences from gastric juice. In 7 of the 13 infants, it was sterile and coliforms were not isolated. In those in whom organisms were present, the types were similar to those found in the nose, throat, and stomach, thus suggesting contamination of the duodenum from higher up in the gastrointestinal tract. Under the effect of prolonged intubation, the total bacterial count rose only slightly from 6.8 to 7.02 $\log_{10}$/ml after 24 hr. However, a marked qualitative change in the microflora occurred during that time. The number of *Escherichia coli* in the duodenum, expressed as a percentage of the total amount, had increased after 9 hr and further increased by 24 hr. *Klebsiella* were also frequently isolated after 24 hr intubation. It is sugggested that prolonged intubation be avoided in future bacteriological studies.

5301 OBSERVATIONS ON THE PATHOGENESIS OF PERITONEAL ADHESIONS: A LIGHT AND ELECTRON MICROSCOPICAL STUDY. *(E.)* Milligan, D. W.; Raftery, A. T. (Dept. Anatomy, Univ. Leeds, England). *Br. J. Surg.* 61(4):274-280, 1974.

The development of peritoneal adhesions in 75 male Sprague-Dawley rats following abdominal surgery were observed by light and electron microscopy over a period up to 2 months postoperative. The method of multiple peritoneal trauma used here to induce adhesions yielded only one animal completely free from adherent complications. Essentially the changes which occurred were those which are seen in healing by fibrosis. However, in many areas of adhesion, numerous eosinophils were observed by electron microscopy, and in these areas little proliferation of fibroblasts was seen. Conversely in sites where fibroplasia and collagen formation were well advanced there were no eosinophils present. Since eosinophils have antihistamine activity, it is possible that they reduce the effect of the histamine released during the inflammatory process. Thus, local detoxification of histamine by eosinophils could indirectly reduce fibroblast proliferation while a new mesothelium is formed and thus prevent adhesion formation. Further investigation of the role of antihistamine drugs in the prevention of peritoneal adhesions is warranted on the basis of results of this study.

5302 PEROPERATIVE EVALUATION OF THE VIABILITY OF ISCHAEMIC COLON IN PRIMATES. *(E.)* Moossa, A. R.; Skinner, D. B.; Zarins, C. K.; Rhodes, B. A. (Univ. Chicago Hosp., Clin., Ill.) *Br. J. Surg* 61(4):301-304, 1974.

A quantitative method of predicting the eventual course of an ischemic colon segment found at laparotomy is presented here by use of an experimental model. Ischemic colitis was produced in 14 rhesus monkeys by complete vascular occlusion of the splenic flex for periods varying from 4 to 8.5 hr. Visual assessmen of bowel viability following revascularization was inaccurate in 10 monkeys. All the animals passed blood and mucus per rectum from 12-48 hr following the release of vascular occlusion. The amount of bleeding was variable but was most pronounced in the monkeys with marked reactive hyperemia. Two monkeys died 3 to 4 days following the experiment with gangrene of the splenic flexure and fecal peritonitis. Another monkey developed an external fecal fistula on the 5th day and was still excreting feces via the anterior abdominal wall 7 weeks later. Post-mortem examination demonstrated an internal fistula with the small bowel also present. Four monkeys had complete resolution from their ischemic episode; all had increased radioactivity uptake over the injured segment and both junctions. The remaining 7 showed varying degrees of colonic stricture and obstruction with or without local perforations, abscess and internal fistula formation. Quantitative measurement of reactive hyperemia using 3-4 mCi of ^{99m}techentium-tagged albumin microspheres with 15-30 m diameters (injected into the upper abdominal aorta via retrograd catheters) correlated well with autopsy findings. Marked hyperemic response suggested a transient form f ischemic colitis while a diminished or absent yperemic response predicted the development of stricures or gangrene of the colon segment.

303 METABOLIC AND CLINICAL EFFECTS OF PURE CRYSTALLINE 1α-HYDROXYVITAMIN D_3 AND 1α,25-DIHYDROXYVITAMIN D_3. STUDIES OF INTESTINAL CALCIUM TRANSPORT, RENAL TUBULAR FUNCTION AND BONE METABOLISM. (*E.)* Pechet, M. M.; Hesse, R. H. (Res. Inst. Med., Chem., Cambridge, Mass.). *Am. J. Med.* 57(1):13-20, 1974.

The effects of vitamin D_3 and two of its analogs, 1α-hydroxy-vitamin D_3 and 1α25-dihydroxy-vitamin D_3, were evaluated in a series of 3 investigations. In thyroparathyroidectomized rats, crystalline 1α-hydroxyvitamin D_3 (i.v. 0.1 μg) was more potent in increasing serum calcium concentration and urinary calcium and hydroxyproline excretion than 1α25-dihydroxy-vitamin D_3 (i.v. 0.1 μg). The effects of the former appeared and disappeared earlier. With either analog, concomitant administration of calcium augmented the decrease in urinary phosphorus. Both analogs were antagonistic to the phosphaturic action of parathyroid hormone (perfused i.v. as parathyroid extract 0.05 U/hr together with triiodothyronine 0.05 μg/hr). The analogs also showed a direct action on renal tubular reabsorption of phosphorus which is mediated by tubular calcium ion concentration. (2) In anephric rats, vitamin D_3 was effective in increasing serum calcium as were the analogs, but all 3 were ineffective in reestablishing a normal serum calcium level. These results are at variance with the prevailing concept that transformation of vitamin D_3 into an active metabolite is necessary for the expression of its biologic activity. (3) In patients with osteomalacia, crystalline 1α-hydroxy-vitamin D_3 induced a therapeutic response as shown by metabolic balance studies. In addition, bone biopsy examinations before and after therapy demonstrated mineralization of osteoid tissue as well as increases in both bone resorption and bone formation. In humans, 1α-hydroxy-vitamin D_3 is active when administered either orally or parenterally. Due to its shorter half-life, the rapid onset and cessation of activity of 1α-hydroxy-vitamin D_3 compared to vitamin D_3 should be of some benefit in the treatment of anephric patients and those with renal osteodystrophy, and that factor added to the analog's biologic activity portend less toxicity than that associated with the chronic administration of large doses of vitamin D_3.

5304 DISTRIBUTION OF BLOOD FLOW TO THE LAYERS OF THE SMALL BOWEL IN EXPERIMENTAL CHOLERA. *(E.)* Norris, H. T.; Sumner, D. S. (VA Hosp., Seattle, Wash.). *Gastroenterology* 66(5):973-981, 1974.

By analysis of multiexponential clearance curves recorded after intraarterial instillation of ^{133}xenon in saline into secondary ileal arcades in 12 dogs, the rate, distribution, and volume of blood flow to the layers of the small bowel were determined. Each clearance curve was factored into 4 components: countercurrent flow, mucosal-submucosal flow, muscular layer flow, and mesenteric fat layer flow. The same segment was studied empty in each animal, while producing choleraic effluent (cholera enterotoxin, 2 g dissolved in 30 ml distilled water), and while producing effluent with mean arterial blood pressure reduced 50% by phlebotomy. No significant difference in blood flow rate or volume was found under normotensive conditions when empty ileum was compared with choleraic ileum. Although marked changes in the volume and distribution of blood flow to the bowel wall occurred, these changes were no greater than those reported for shock alone. Thus it is suggested that the role of the microcirculation in experimental cholera is of secondary importance. It is further suggested that the primary effect of cholera enterotoxin is an epithelial phenomenon causing secretion of effluent.

5305 STUDIES ON THE DISTRIBUTION AND DEGRADATION OF HEPTADECAPEPTIDE, BIG, AND BIG BIG GASTRIN. *(E.)* Straus, E.; Yalow, R. S. (VA Hosp., Bronx, N.Y.). *Gastroenterology* 66(5):936-943, 1974.

Spaces of distribution and rates of degradation were determined for both unlabeled and radioiodinated gastrin peptides after pulse injection. The major forms of circulating gastrin, hepatadecapeptide gastrin, big gastrin, and big big gastrin had half-times for disappearance of approximately 3, 9, and 90 min., resp. Since the plasma concentration of each component under steady state conditions is determined not only by its secretion rate, but also by its distribution into extravascular spaces and its rate of degradation, these findings put into proper perspective the previously reported findings of the relative concentrations of the 3 components under different clinical conditions and in response to physiologic secretagogues and suppressants. For example, the strikingly long half-life of big big gastrin correlates well with its high relative concentration in the fasting state of several species. The observed differences in metabolism of the various hormonal forms makes clear the importance of determining the relative concentration of each component in the plasma in experiments dealing with the fate of endogenous gastrin.

5306 ESCAPE OF INTESTINAL RESISTANCE VESSELS TO ANGIOTENSIN II. *(E.)* McNeill, J. R. (Coll. Med., Univ. Saskatchewan, Saskatoon, Canada). *Can. J. Physiol. Pharmacol.* 52(3):458-464, 1974.

The escape phase of the intestinal resistance vessel response to infusions of angiotensin II was studied in pentobarbital-anesthetized cats using a technique which did not involve cannulation of the arterial supply to the intestine. During intravenous infusions of angiotensin, the escape was 30% of the peak response. The escape was not related to the increase in arterial pressure. In low doses, the escape during intra-arterial infusions was similar to that observed during intravenous administration. Graded increases in the infusion dose of angiotensin produced increasing vasoconstriction except at high doses. The results indicate that escape of the intestinal resistance vessels to angiotensin is only partial and that a significant vasoconstriction is maintained. The results are consistent with the postulated role of endogenous angiotensin in the mechanism of the intestinal vasoconstriction following hemorrhage.

5307 SPIRONOLACTONE AND TESTICULAR CYTOCHROME P-450: DECREASED TESTOSTERONE FORMATION IN SEVERAL SPECIES AND CHANGES IN HEPATIC DRUG METABOLISM. *(E.)* Menard, R. H.; Stripp, B.; Gillette, J. R. (Natl. Heart Lung Inst., Bethesda, Md.). *Endocrinology* 94 (6):1628-1636, 1974.

5308 INFLUENCE OF PREGNANCY AND LACTATION ON THE HEALING PROCESSES OF GASTRIC AND DUODENAL ULCER MODELS IN THE RAT. *(E.)* Takeuchi, K.; Okabe, S.; Takagi, K. (Dept. Chem. Pharmacol., Univ. Tokyo, Japan). *Experientia* 30(4):366-368, 1974.

5309 STABILIZATION OF ISOLATED RAT LIVER PLASMA MEMBRANES BY TREATMENT IN VITRO WITH SILYMARIN. *(E.)* Ramellini, G.; Meldolesi, J. (Inst. Pharmacol., Univ. Milan, Italy). *Arzneim. Forsch.* 24(5):806-808, 1974.

5310 OXYGEN AND CARBON DIOXIDE TENSIONS IN THE ABDOMINAL CAVITY AND COLONIC WALL OF THE RABBIT. *(E.)* Klossner, J.; Kivisaari, J.; Niinikoski, J. (Dept. Surg., Univ. Turku, Finland). *Am. J. Surg.* 127(6):711-715, 1974.

5311 PANCREATIC HYPOPERFUSION AND THE PRODUCTION OF A MYOCARDIAL DEPRESSANT FACTOR IN HEMORRHAGIC SHOCK. *(E.)* Lefer, A. M.; Spath, Jr., J. A. (Univ. Virginia Sch. Med., Charlottesville). *Ann. Surg.* 179(6):868-876, 1974.

5312 THE EFFECT OF SOME LIVER ENZYME INHIBITORS ON THE HEPATIC INACTIVATION OF ERYTHROPOIETIN IN MICE. *(E.)* Loeber, J. G.; Bosch, E.; Goudsmit, R.; Kolk-Vegter, A. J. (Dept. Internal Med., Univ. Amsterdam, Netherlands). *Br. J. Haematol.* 27(1):163-167, 1974.

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5358 A METHOD FOR GRADED PORTAL VEIN STENOSIS IN RATS: SURVIVAL RELATED TO DEGREE OF STENOSIS. *(E.)* Myking, A. O.; Halvorsen, J. F. (Dept. Pathol., Gade Inst., Bergen, Norway). *Eur. Surg. Res.* 5(6):454-457, 1973.

5359 BREATH-ANALYSIS TESTS IN GASTROENTEROLOGY. *(E.)* Newman, A. (Central Middlesex Hosp., London, England). *Gut* 15(4):308-323, 1974.

5360 ANTIGENIC CROSS-REACTION BETWEEN MOUSE INTESTINE AND A MEMBER OF THE AUTOCHTHONOUS MICROFLORA. *(E.)* Foo, M. C.; Lee, A. (Univ. New South Wales, Sch. Microbiol., Kensington, Australia). *Infect. Immun.* 9(6):1066-1069, 1974.

5361 ROLE OF THYROID ANTIGENS IN PROTECTION AND PATHOGENICITY FOR MICE. *(E.)* Diena, B. B.; Baron, L. S.; Johnson, E. M.; Wallace, R.; Ashton, F. E. (Lab. Ctr. Disease Control, Ottawa, Canada). *Infect. Immun.* 9(6):1102-1104, 1974.

5362 CASE REPORT: PSEUDO-TUMOR OF THE LIVER IN HEPATITIS. *(E.)* Raouf, R.; Stebner, F. C. (Div. Nucl. Med., Wayne State Univ., Detroit, Mich.). *J. Am. Med. Wom. Assoc.* 29(6):262-264, 1974.

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See also, 5208.

DIAGNOSTIC PROCEDURES

5365 SCINTIGRAPHY AS A SCREENING TEST FOR CARCINOMA OF THE PANCREAS. *(E.)* Watanabe, K.; Kawahira, K.; Matsuura, K. (Kyushu Univ. Sch. Med., Fukuoka, Japan). *Acta Radiol. (Diagn.) Stockh.* 15(1):57-64, 1974.

Pancreatic scintigraphy with ^{75}Se-selenomethionine was performed on 196 patients with various pancreatic disorders. The diagnosis of 83 of the cases was confirmed at surgery or autopsy and was suggested in 113 cases by symptoms, signs, and various laboratory examinations. Scintigrams were divided into 5 groups: localized defect, total defect, faint defects, displacement, and normal. Of the 39 patients with carcinoma of the pancreas, 22 had a localized defect in the pancreatic scintigram. A total defect occurred in 14 cases, indicating an abnormal scintigram in 92% of the cases. The scintigram was normal in 19 cases (44%). There was a localized defect in 8 (19%), faint defects in 7 (17%), and a total defect in 9(21%) of the 43 patients with pancreatitis. Normal scintigrams were obtained in 73 cases (89%), faint defects in 6 (7.3%), total defect in 2 (2.4%), and displacement in 1 (1.2%) of the patients later found to be normal. No patients with a localized defect were normal, and patients with carcinoma of the pancreas had a faint defect. Of the 100 patients with normal scintigrams, 73 were free of pancreatic disease. It is concluded that pancreatic scintigraphy is a useful means for diagnosing carcinoma of the pancreas.

5366 FACTORS INFLUENCING DUODENAL TRYPSIN LEVELS FOLLOWING A STANDARD TEST MEAL AS A TEST OF PANCREATIC FUNCTION. *(E.)* Zeitlin, I. J.; Sircus, W. (Univ. Strathclyde, Glasgow, Scotland). *Gut* 15(3):173-179, 1974.

The Lundh test was used to assess pancreatic function and to study disease and other pertinent factors which could influence the accuracy of diagnosis. This study was done on 98 patients with suspected pancreatic disease; retrospectively on 32 patients with already definitely diagnosed pancreatic status (15 negative and 17 diseased) and on 17 controls with non-pancreatic conditions such as anxiety states and ulcers (gastric or duodenal). The Wiggins trypsin assay used here on varying dilutions of crystalline trypsin gave a linear concentration/activity curve with a threshold of 50 µg/ml of crystalline trypsin. In the control group, trypsin values were similar to those found by other workers and were unaffected by the sex or age of the subjects. When used to assess the 32 already diagnosed patients, the test had a diagnostic success rate of 94%. Analysis of results from 98 patients with suspected pancreatic disease showed that trypsin levels were generally grossly reduced in patients with later established diagnoses of chronic pancreatitis or carcinoma of the head of the pancreas. The Lundh test distinguished nonpancreatic from pancreatic steatorrhea, except for possible false positive results in diabetes mellitus, bile duct obstruction, and villous atrophy.

5367 RAPID AND ACCURATE PREOPERATIVE DIAGNOSIS OF OBSTRUCTIVE JAUNDICE. UTILIZATION OF VISCERAL ANGIOGRAPHY AND TRANSHEPATIC CHOLANGIOGRAPHY. *(E.)* Kaplan, M. S.; Juler, G. L.; Stanton, W.; Eisenman, J. I. (Dept. Surg., Univ. California, Irvine). *Arch. Surg.* 108(6):825-829, 1974.

Percutaneous transhepatic cholangiography and selective visceral angiography were performed prior to surgery in 25 patients (44-84 years old, average 60.5 years) in order to identify possible malignancy and to locate the obstruction. Selective visceral angiography was diagnostic preoperatively in 60% of the patients and percutaneous transhepatic cholangiography in 76%. However, the combination of the 2 methods was diagnostic in 96% of the cases. Combination studies accurately predicted the cause in all 19 patients found to have a malignant tumor at laparotomy, although individual studies separately were positive in 72% with selective visceral angiography and 83% using percutaneous transhepatic cholangiography. The accuracy of these studies on obstructive jaundice contrasts sharply with the low yield of precise information obtained from chemical profiles, upper gastrointestinal tract series, barium enemas, and liver scans as to the cause of obstruction, especially malignancy, and its exact location.

5368 GALLIUM SCANNING IN ACUTE HEPATIC AMEBIC ABSCESS. *(E.)* Geslien, G. E.; Thrall, J. H.; Johnson, M. C. (Walter Reed Gen. Hosp., Washington, D.C.). *J. Nucl. Med.* 15(7):561-563, 1974.

Previous investigators concluded that hepatic amebic abscesses, unlike pyogenic abscesses, did not accumulate ^{67}gallium-citrate and included such cases among their correct negatives. In this report, 2 patients (male, 22 and 34-yr-old) with acute hepatic amebic abscess who showed identical patterns of ^{67}gallium-citrate accumulation in the periphery of the abscess cavity are described. Analysis of the ^{67}gallium distribution in comparison with the ^{99m}technetium-sulfur-colloid scans in the same patients indicated the probable site of localization as the region of hyperemia seen histologically and arteriographically, and also shed additional light on the pathophysiology of acute hepatic amebic abscesses. The results indicate that ^{67}gallium-citrate liver scanning performed after a radiocolloid study is a second modality which can increase the specificity and accuracy of diagnosis.

5369 LIVER SNAPS AND THE DETECTION OF CLINICALLY UNSUSPECTED LIVER METASTASES. *(E.)* Davies, R. J.; Vernon, M.; Croft, D. N. (St. Thomas' Hosp., London, England). *Lancet* 1(7852):279-280, 1974.

Since 50% of livers invaded by secondary tumors are normal in size, this study was designed to assess the value of preoperative radioisotope imaging of clinically normal livers in 46 patients with treatable proven carcinoma of the large intestine with no hepatomegaly. At operation or necropsy, 8 (17%) showed hepatic secondaries. Liver snaps detected single or multiple hepatic metastases in 7 of these patients; and in one patient, the snaps revealed a secondary liver tumor missed at surgery but confirmed at autopsy. Of the 8 patients with liver metastases, 7 were dead within 10 months of operation while over the same period of time, only 2 (5%) of those without liver secondaries had died. The radioisotope technique, involving the use of sulfur colloid labeled with technetium-99m and a Nuclear Enterprises gamma camera (whose images are called "liver snaps" at this hospital), gave a correct answer in 44 patients, an overall accuracy of 95%. This evidence implies that liver imaging is useful in the preoperative assessment of patients with cancer, even if the liver is clinically normal.

5370 MANOMETRIC ENDOSCOPIC RETROGRADE PANCREATOCHOLANGIOGRAPHY: TECHNIQUE, SIGNIFICANCE AND EVALUATION.

(E.) Kasugai, T.; Kuno, N.; Kizu, M. (Aichi Cancer Ctr. Hosp., Nagoya, Japan). *Am. J. Dig. Dis.* 19(6):485-502, 1974.

In endoscopic pancreatocholangiography, the precision of investigative results was retained but pancreatic damage due to excessive pressure was avoided by use of a recently developed manometer described here. This method permitted measurement and control of the injection pressure of the contrast medium. Of 687 attempted examinations on patients suspected of having pancreatic and/or biliary tract disease, 636 cannulations (92.6%) were successful. The desired duct or ducts were visualized in 611 cases (88.9%). The 636 cases cannulated consisted of 341 endoscopic pancreatographies, 64 endoscopic cholangiographies and 231 endoscopic pancreatocholangiographies. All malignant lesions diagnosed by the last method were proven at surgery or autopsy to be cancerous. Findings of pancreatic carcinoma were characterized by stenosis and obstruction of the main pancreatic duct and sometimes by a peripheral filling defect. The types encountered in order of frequency were: obstructed, stenosed, pancreatic-field-defect, and mixed types. Chronic pancreatitis was classified into 3 groups: minimal, moderate, and advanced pancreatitis, according to a grading of findings in endoscopic pancreatocholangiography. The main findings of minimal and moderate pancreatitis were pancreatectasis, while advanced disease showed opacification of the biliary system. There was a close correlation between histological and endoscopic grading of chronic pancreatitis. General results using this manometric method showed a decrease of 20% in elevation of serum amylase activity and a reduction in frequency of acinar filling. No clinical evidence of acute pancreatitis was seen. Although 3 cases of infection occurred (1 in liver abscess and choledocholithiasis and 2 in advanced pancreatic carcinoma of the stenosed type), no further complications of infection were observed when chemotherapeutics were mixed with the contrast material. These findings indicate that endoscopic pancreatocholangiography using the described monometric techniques is one of the most reliable procedures for the detection of diseases of the pancreatic and biliary systems.

5371 ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY.

(E.) Liguory, C.; Gouerou, H.; Chavy, A.; Coffin, J. C. (Hosp. Rothschild, Paris, France). *Br. J. Surg.* 61(5):359-362, 1974.

Retrograde cholangiopancreatography was accomplished by direct non-operative injection of radio-opaque material through a cannula introduced at the duodenal papilla by means of a fiber-optic duodenoscope. This method achieved opacification of the bile ducts, the pancreatic duct or the entire biliary-pancreatic duct system in 392 (89%) of 439 patients in whom it was attempted. The desired ducts were opacified in 75% of cases; the bile ducts in 206 out of 278 and the pancreatic duct in 120 out of 161 cases. The anatomical conditions found were: 30% along common biliary-pancreatic channel; 28% short common biliary-pancreatic channel; 24% hepatopancreatic ampulla with 2 orifices; 18% duodenal papilla with 2 orifices; less than 1% no papilla, with 2 orifices on the duodenum. Morbidity resulting from the procedure consisted of infectious reactions in 20 out of 295 patient in whom the bile ducts were opacified as well as hyperamylasemia and abdominal pain in 28 out of 300 patients in whom the pancreatic duct was opacified. This method was of value in diagnosing the cause of cholestatic jaundice; in non-jaundiced subjects, it complemented or clarified inconclusive cholangiograms or cholecystograms obtained by other techniques. When dilated bile ducts appear, operation should not be delayed, otherwise there is a risk of cholangitis. Pancreatic carcinoma may be revealed by stenosis, partial or total, of the pancreatic duct or by filling defects in the pancreatic parenchyma, but chronic pancreatitis may also cause partial stenosis of the pancreatic duct. A filiform appearance of the pancreatic duct suggests chronic pancreatitis. The only complication after retrograde pancreatography is hyperamylasemia and its associated clinical manifestations. Possibly some method of controlling the injection pressure may reduce the incidence of this type of reaction.

5372 SIMPLIFIED CHOLANGIOGRAPHY USING IOGLYCAMIDE.

(E.) Parkin, G. J. S.; Herlinger, H. (Gen. Infirm., Leeds, England). *Gut* 15(4):268-272, 1974.

Intravenous cholangiograms were performed on 100 nonicteric patients (32 males, and 68 females, 19-81 yr old, mean age 54 yr) with the use of methylglucamine ioglycamide (Biligram). Fifty patients received 10.5 g of contrast medium, and 50 received 5.25 g injected evenly over 5 min. Side effects, reported in only 13% of the patients, were all mild consisting of urticaria (2), nausea (3), and metallic taste in mouth (8). Radiographs were taken 10, 30, 60, 90, and 120 min after injection and were assessed without the authors being aware of the dose of contrast medium injected. It was found that better statistically significant results were obtained using the higher dose. In patients with the gallbladder present, films taken at 60 and 90 min after injection gave the maximum available information in 97% of the cases. If the gallbladder has not become opacified by 60 min, cystic duct obstruction was indicated. Postcholecystectomy patients showed maximum available information in 95% of the cases in films taken at 30 min and 60 min after injection. The findings obtained in this study provide a simple procedure for intravenous cholangiography. Utilization of the radiographic room is not essential for the whole procedure, as the injection can be given in an anteroom, and the complete examination takes less than 10 minutes with the patient on the table.

5373 PANCREATOGRAPHY IN RELAPSING PANCREATITIS.

(E.) Arnesjo, B.; Kugelberg, C.; Tylen, U. (Univ. Hosp., Lund, Sweden). *Acta Chir. Scand.* 140(2):131-137, 1974.

To evaluate the significance of preoperative pancreatography, radiological findings were correlated with clinical and operative findings in 31 patients with relapsing pancreatitis and in 3 additional patients with inflammatory pancreatic disease. Radiological examinations were performed from the amputated tail surface in 28 cases and using the transampullary technique in 6 cases. On the basis of operative findings apart from pancreatography, the patients were classed as severe (14), moderate (9), and slight (8) pancreatitis cases. Pancreatography revealed 10-12 occurrences each of dilation, irregular walls, branch filling and strictures in the severe group; while the moderate cases exhibited only 4-6 occurrences of each of these abnormalities, and the slight group 0-3 each. Complete obstruction was found 3 times in both the severe and the moderate groups. Radiologically, the severity and frequency of these abnormalities were found to correlate well with the seriousness of the inflammatory process observed during operation. Cysts communicating with the duct and calculi were mainly demonstrated in the group of patients with severe pancreatitis. Results indicate that operative examination of the pancreas combined with pancreatography via the transected tail are of great value in the diagnosis and selective surgical management of patients with relapsing pancreatitis.

5374 MINUTE ENDOSCOPICAL FINDINGS OF DUODENAL MUCOSA USING THE DYE SCATTERING METHOD.

(E.) Kohli, Y.; Nakajima, M.; Ida, K.; Kawai, K. (Kyoto Pref. Univ. Med., Japan). *Endoscopy* 6(1):1-6, 1974.

The duodenoscopic application of the direct dye scattering method was used to identify minute lesions of the duodenal mucosa in 173 patients. The patient group included 54 cases of single round duodenal ulcers and scars, 17 cases of linear ulcers, 75 cases of multiple ulcers, 11 cases of duodenal erosions, 5 cases of polyploid lesions, and 11 cases of normal duodenal mucosa. The effect of the dye scattering method was insufficient to observe minute findings in the duodenal mucosa in or around the lesion in 5 of the 173 cases. Minute findings were either partly or completely observed in 130 (75.1%) of the cases, and information unobtainable by usual endoscopy was obtained in 38 cases (22.0%). Not only could ulcers or ulcer scars be clearly visualized, but also the villous pattern of the duodenal mucosa. Around the ulcer the villi became more and more irregular in shape and size, showing also minute defects and microerosions. Minute elevations were due to hyperplasia of Brunner's glands. The frontal viewing duodenoscopes seemed superior in recognizing this microarchitecture to the side-viewing type.

5375 CHOLECYSTOKININ CHOLECYSTOGRAPHY: CONTROLLED EVALUATION IN THE DIAGNOSIS AND MANAGEMENT OF PATIENTS WITH POSSIBLE ACALCULOUS GALLBLADDER DISEASE.

(E.) Dunn, F. H.; Christensen, E. C.; Reynolds, J.; Jones, V.; Fordtran, J. S. (Univ. Texas Southwestern Med. Sch., Dallas). *JAMA* 228(8):997-1003, 1974.

X-ray films of the opacified gallbladder were taken at intervals following i.v. injection of cholecystokinin (75 Ivy dog U) in 44 control subjects and in 49 patients with biliary colic (aged 22-61 yr) and in 25 patients with dyspepsia (aged 17-84 yr). Even though all the patients showed histories suggestive of gallbladder disease, the routine cholecystography in each was normal. Abnormal X-ray results were found in 30-40% of the patients, but the incidence of "false-positive" results was high in the control group (14-36%, according to 3 radiologists). Cholecystectomy was performed in 29 cases due to continued pain. The clinical response to surgical treatment and the histologic findings in the resected gallbladders were similar in patients with normal and abnormal preoperative cholecystokinin cholangiographic studies. It is concluded that, as currently used, cholecystokinin cholecystography is not helpful in the diagnosis and management of patients with suspected acalculous gallbladder disease.

5376 AMYLASE ISOENZYMES DURING VIRAL INFECTIONS OF THE PANCREAS AND SALIVARY GLANDS.

(E.) Ross, M. E.; Wolf, R. O.; Notkins, A. L. (Natl. Inst. Dental Res., Natl. Inst. Hlth., Bethesda, Md.). *J. Lab. Clin. Med.* 83(5):750-756, 1974.

Since viral infections produce severe alterations in total serum amylase, this study of amylase levels related to pathologic changes as well as measurement of serum pancreatic and parotid amylase concentrations with disease was initiated. Infection of DBA/2 mice with Coxsackie B viruses produced severe acinar pancreatitis and a 5-fold rise in serum amylase levels by the 2nd day. Concurrently, pancreatic amylase content fell, and remained less than 5% of normal for several months. Infection produced permanent, extensive necrosis of pancreatic acinar tissue. Analysis of serum isoamylases by polyacrylamide gel electrophoresis revealed that during the acute phase of the infection, the hyperamylasemia (10 times normal isoamylase level) was predominatly pancreatic in origin. No rise in salivary isoamylase was seen. After infection, the amylase level in the serum returned to normal, but isoamylase analysis detected a marked decrease in the pancreatic isoamylases. In contrast, the M variant of encephalomyocarditis (EMC) virus produced severe beta-cell damage but relatively little damge to the acinar cells of the pancreas and parotid glands. Serum amylase levels rose only slightly during the acute phase of the infection but were depressed for prolonged periods thereafter. Analysis of serum isoamylases revealed decreased levels of both pancreatic and salivary isoamylases. These results indicate that quantitation of serum isoamylases might be a useful tool for detecting and differentiating pancreatic and parotid gland diseases.

5377 USE OF THE ^{198}AU LIVER SCAN IN ASSESSING THE THERAPEUTIC EFFECT OF PENICILLAMINE IN WILSON'S DISEASE. *(E.)* Chajek, T. (Hadassah Univ. Hosp., London, England). *Postgrad. Med. J.* 50(582): 207-208, 1974.

In a 14-yr-old girl Wilson's disease was found to be the cause of an active cirrhosis diagnosed months previously. The diagnosis of Wilson's disease was confirmed by the finding of bilateral Kayser-Fleischer ring on slit lamp examination. Repeated examinations revealed a serum ceruloplasmin concentration of 16-18 mg/100 ml; 24-hr urinary copper excretion was 330 μg. ^{198}Au liver scan showed very low uptake by the liver, and a high ^{198}Au concentration in the enlarged spleen. Treatment with D-penicillamine (2 g/day) caused marked clinical and biochemical improvement. The spleen decreased in size, liver function tests improved, jaundice and ascites disappeared, and esophageal varices diminished. Repeated ^{198}Au liver scans revealed increased liver uptake of ^{198}Au, presumably a reflection of improved liver circulation and reduction in portal hypertension. Repeated liver scanning in Wilson's disease patients may provide another easy and safe test for evaluating the effect of penicillamine therapy, especially in patients in whom repeated liver biopsy may be contraindicated.

5378 RETROGRADE PANCREATOCHOLANGIOGRAPHY BY ENDOSCOPIC CATHETERIZATION OF THE PAPILLA OF VATER. *(Fr.)* Liguory, C.; Bitoun, A.; Bognel, J. C.; Coffin, J. C.; Gouerou, H.; Chavy, A. (no affil.). *Vie Med.* 54(36):4583-4604, 1973.

5379 TECHNIQUE AND VALUE OF FIBROSCOPY OF THE COLON OR COLOSCOPY. *(Fr.)* Duhamel, J.; Bognel, J. C.; Liguory, C.; Bitoun, A.; Binh, N.; Lunel, J. (St. Antoine Hosp., Paris, France). *Vie Med.* 54(36): 4607-4613, 1973.

5380 PANCREATIC DIAGNOSIS WITH ECHOGRAPHY. *(Ger.)* Rettenmaier, G. (Med. Clin., Univ. Erlangen, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:865-868, 1973.

5381 DETERMINATION OF FECAL TRYPSIN AND CHYMOTRYPSIN AS A SCREENING TEST FOR EXOCRINE PANCREATIC INSUFFICIENCY. *(Ger.)* Schneider, R.; Durr, H. K.; Bode, J. C. (Med. Clin., Univ. Marburg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:859-861, 1973.

5382 COMPARISON OF THE CLINICAL VALUE OF BALANCE, TOLERANCE, AND SEGMENTAL PERFUSION TECHNIQUES IN DIAGNOSIS OF THE SMALL INTESTINE. *(Ger.)* Menge, H.; Gottesburen, H.; Bloch, R.; Lorenz-Meyer, H.; Riecken, E. O. (Med. CLin., Univ. Marburg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79: 843-845, 1973.

5383 ECHOGRAPHIC DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS OF DIFFUSE LIVER DISEASE: NOTES ON QUANTITATIVE EVALUATION AND RESULTS. *(Ger.)* Rettenmaier, G. (Med. Clin., Univ. Erlangen, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:962-964, 1973.

5384 THE SIGNIFICANCE OF THE ENTEROHEPATIC CIRCULATION FOR EVALUATING BILE ANALYSES AS LIVER FUNCTION TESTS. *(Ger.)* Klapdor, R.; Schliewe, J. (1st Med. Clin., Univ. Hamburg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:957-958, 1973.

5385 RADIOLOGICAL DIAGNOSIS OF THE LIVER AND PORTAL HYPERTENSION. *(Ger.)* Dombrowski, H. (Med. Clin., Univ. Marburg, Germany). *Internist (Berlin)* 14(8):377-385, 1973.

5386 SPECTRUM AND SCOPE OF RADIOLOGICAL METHODS FOR DIAGNOSING PANCREATIC DISEASE. *(Ger.)* Swart, B.; Meyer, G.; Herrmann, J. F. (Lukas Hosp., Neuss, Germany). *Internist (Berlin)* 14(8):386-396, 1973.

5387 THE POSIBILITIES OF MODERN GASTRODUODENOSCOPY IN THE OLYMPUS INSTRUMENTS. *(Ger.)* Safrany, L. (1st Med. Clin., Semmelweis Univ., Budapest, Hungary). *Zentralbl. Chir.* 98(32):1137-1147, 1973.

5388 FIBROSCOPY OF THE OPERATED STOMACH. *(Fr.)* Coffin, J. C.; Capelle, P.; Liguory, C. (no affil.). *Vie Med.* 54(36):4577-4581, 1973.

5389 FIBROSCOPY IN THE DIAGNOSIS OF UPPER GASTROINTESTINAL BLEEDING. *(Fr.)* Capelle, P.; Bitoun, A.; Bognel, J. C.; Coffin, J. C.; Huguier, M.; Liguory, C. (no affil.). *Vie Med.* 54(36):4565-4572, 1973.

5390 FIBROSCOPY IN GASTRIC CANCER. *(Fr.)* Liguory, C.; Bognel, J. C.; Coffin, J. C.; Bitoun, A.; Capelle, P. (no affil.). *Vie Med.* 54(36):4545-4550, 1973.

5391 FIBROSCOPY IN PEPTIC ULCERS. *(Fr.)* Bitoun, A.; Liguory, C.; Bognel, J. C. (no affil.). *Vie Med.* 54(36):4555-4562, 1973.

5392 GASTRIN, A HORMONE OF THE GASTRIC ANTRUM. II. THE PRACTICAL VALUE OF GASTRIN DETERMINATIONS IN VARIOUS DISEASES. *(Ger.)* Sauberli, H.; Largiader, F.; Vetter, W. (Surg. Clin. A., Univ. Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 104(21):745-751, 1974.

5393 SCANNING TO EVALUATE THE CONDITION OF THE LIVER IN CANCER PATIENTS. *(Rus.)*

Dukenbaeva, A. B.; Karataev, K. M. (no affil.). *Vestn. Akad. Nauk Kazakh. SSR* (1):66-69, 1974.

5394 USE OF NEOSTIGMINE IN THE RADIOLOGICAL DIAGNOSIS OF GASTROESOPHAGEAL REFLUX. *(Rus.)* Orlov, V. P. (Chita Med. Inst., USSR). *Vestn. Rentgenol. Radiol.* (2):93-95, 1973.

5395 ANGIOGRAPHY IN CHRONIC STENOSIS OF GASTROINTESTINAL ARTERIES. *(Fr.)* Poilleux, J.; Hivet, M. (St. Antoine Hosp., Paris, France). *Ann. Chir.* 27(6):655-657, 1973.

5396 THE CONTRIBUTION OF SELECTIVE ARTERIOGRAPHY IN EMERGENCY SITUATIONS DURING GASTRODUODENAL BLEEDING. *(Fr.)* Larrieu, H.; Maliakas, S.; Grall, A.; Bare, A. (Antoine Beclerc Hosp., Clamart, France). *Ann. Chir.* 27(6):611-614, 1973.

5397 CURRENT METHODS FOR INVESTIGATING THE GASTROINTESTINAL SYSTEM IN CHILDREN. *(Rus.)* Zhukova, N. P.; Volkova, A. A.; Ul'ianycheva, M. F. (Gorki Sci. Res. Inst., Pediatr., USSR). *Vopr. Okhr. Materin. Det.* 18(6):7-12, 1973.

5398 ANALYSIS OF 162 LIVER BIOPSIES FROM CHILDREN. *(Ger.)* Cihula, J.; Vortel, V.; Herout, V. (Pediatr. Clin., Charles Univ., Hradec Kralove, Czechoslovakia). *Tijdschr. Gastroenterol.* 16(4):264-282, 1973.

5399 EXPERIMENTAL STUDIES ON TUBELESS TECHNIQUES TO DETERMINE GASTRIC ACID WITH SUFFICIENT REPRODUCIBILITY. *(Ger.)* Rosenbaum, K. D.; Panzig, E. (Surg. Clin., Univ. Greifswald, Germany). *Z. Exp. Chir.* 6(3):187-190, 1973.

5400 EFFECTIVENESS OF HEPATIC SCINTIGRAPHY IN THE SEARCH FOR LOCALIZED SPACE-OCCUPYING PARENCHYMAL DISEASES. *(Ger.)* Bekier, A. (Cantonal Hosp., St. Gallen, Switzerland). *Schweiz. Med. Wochenschr.* 104(20):729-732, 1974.

5401 TOMOECHOGRAPHY IN HEPATOBILIARY DISEASE. *(Sp.)* Perez-Jimenez, F.; de la Fuente, P.; Gonzalez, A.; Muro, J.; Cosme, A. (La Paz Munic. Sanit., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 43(1):1-18, 1974.

5402 STUDY OF STOMACH DISEASES. (ENDOSCOPIC, RADIOLOGICAL, AND SECRETION STUDIES). *(It.)* Mazzone, O.; Catalano, F. (Inst. Clin. Gen. Med., Med. Therap., Univ. Catania, Italy). *Arch. Ital. Mal. App. Dig.* 37(2):103-111, 1973.

5403 THE VALUE OF LAPAROSCOPY IN THE DIAGNOSIS OF HYDATID DISEASE OF THE LIVER. *(Ger.)* Brailski, C. (Med. Acad., Sofia, Bulgaria). *Z. Gesamte Inn. Med.* 29(10):415-417, 1974.

5404 ANALYSIS OF CORRELATIONS BETWEEN THE BEHAVIOR OF PLASMA CLOTTING FACTORS AND SOME OTHER FINDINGS IN PATIENTS WITH OBSTRUCTIVE JAUNDICE. *(Ger.)* Schneider, M.; Schulz, K.; Teichmann, W. (Dept. Gastroenterol., Univ. Rostock, Germany). *Z. Gesamte Inn. Med.* 29(10):407-409, 1974.

5405 TECHNICAL ASPECTS OF PERCUTANEOUS CHOLANGIOGRAPHY. *(Por.)* Tacla, M.; Pinotti, H. W. (Fac. Med., Univ. Sao Paulo, Brazil). *Arq. Gastroenterol.* 11(2):69-72, 1974.

5406 RADIOTELEMETRIC AND TITRATION METHODS IN THE STUDY OF THE ACIDITY OF GASTRIC JUICE. *(Rus.)* Ivashkin, V. T.; Kozhemiakin, L. A. (S. M. Kirov Military Med. Acad., Leningrad, USSR). *Vrach. Delo* (5):104-108, 1974.

5407 SERUM ARGINYL ESTERASE ACTIVITY IN THE DIAGNOSIS OF PANCREATIC DISEASE. *(Ger.)* Bosseckert, H.; Bach, B. (Med. Clin., Friedrich Schiller Univ., Jena, Germany). *Z. Gesamte Inn. Med.* 29(11):459-461, 1974.

5408 EVALUATION OF DIFFERENT METHODS IN DIAGNOSIS OF COLONIC CARCINOMA. *(E.)* Franchini, A.; Giardino, R.; Cola, A. (St. Orsola Univ. Hosp., Bologna, Italy). *Abdom. Surg.* 16(6):168-169, 1974.

5409 SERUM AND URINE AMYLASE IN SURGICAL PATIENTS. *(E.)* Mortensen, E.; Astrup, L. B. (Municipal Hosp., Copenhagen, Denmark). *Acta Chir. Scand.* 140(1):41-44, 1974.

5410 PORTAL PRESSURE CHANGE AFTER INJECTION OF BRADYKININ AND VASOPRESSIN IN CELIAC AND SUPERIOR MESENTERIC ARTERY. *(E.)* Tylen, U.; Norryd, C. (Univ. Hosp., Lund, Sweden). *Acta Chir. Scand.* 140(3):214-216, 1974.

5411 CHRONIC SUBCAPSULAR HEPATIC BILE ABSCESS. A RARE COMPLICATION OF PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY. *(E.)* Lawson, T. L. (George Washington Univ. Med. Ctr., Washington, D.C.). *Am. J. Gastroenterol.* 61(5):383-386, 1974.

5412 PERDUODENOSCOPIC STUDY OF CYSTIC DILATATION OF THE BILE DUCT. *(Fr.)* Jeanpierre, R.; Vicari, F.; Laurent, J.; Berthaux, J. M.; Grosdidier, J. (Res. Group Gastrointestinal Nutr. Pathophysiol., Nancy, France). *Ann. Gastroenterol. Hepatol. (Paris)* 9(4):349-353, 1973.

5413 ENDOSCOPY IN THE EVALUATION OF PATIENTS FOLLOWING GASTRECTOMY. *(E.)* Spainhour,

J. B.; Webster, P. D. (Med. Coll. Georgia, Augusta). *Arch. Intern. Med.* 134(1):52-55, 1974.

5414 RADIOIMMUNOASSAY OF CARCINOEMBRYONIC ANTIGEN. A DIAGNOSTIC TEST FOR CARCINOMA OF THE COLON AND PANCREAS. *(E.)* Nugent, F. W.; Hansen, E. R. (Lahey Clin. Fdn., Boston, Mass.). *Arch. Intern. Med.* 134(1):59-61, 1974.

5415 GAS CHROMATOGRAPHIC MEASUREMENT OF MUCOPOLYSACCHARIDES IN GASTRIC JUICE OF PATIENTS WITH DUODENAL ULCERATION. *(E.)* Donaldson, J. D.; Macrae, K. D.; Parks, T. G.; Rodgers, H. W. (Dept. Surg., Queen's Univ., Belfast, Northern Ireland). *Gut* 15(4):347, 1974.

5416 COLOSCOPY IN THE MANAGEMENT OF BOWEL DISEASE. *(E.)* Deyhle, P. (Dept. Intern. Med., Univ. Zurich, Switzerland). *Hosp. Pract.* 4(6):121-128, 1974.

5417 SCANNING IN DIAGNOSIS OF MECKEL'S DIVERTICULUM. *(E.)* Kilpatrick, Z. M. (Med. Coll. Georgia, Augusta). *Hosp. Pract.* 9(6):131-138, 1974.

5418 THE VALUE OF TOMOGRAPHY AND ELECTIVE RADIOGRAPHY TAKEN IN ERECT POSITION FOR ORAL CHOLECYSTOGRAPHY. *(Pol.)* Danek, Z. (Acad. Med., Krakow, Poland). *Pol. Przegl. Radiol.* 37(6):741-743, 1973.

5419 VALUE OF THE SIMULTANEOUS RADIOISOTOPE DETERMINATION OF LIVER BLOOD FLOW AND CARDIAC OUTPUT IN SOME LIVER DISEASES IN ELDERLY SUBJECTS. *(It.)* Tarolo, G.; Roncari, G.; Michetti, A.; Gatti, A. (Osp. Circolo, Varese, Italy). *Radiol. Med. (Torino)* 59(5):417-427, 1973.

5420 PANCREATIC FUNCTION IN SOME DISEASES OF THE DIGESTIVE SYSTEM FOLLOWING ULTRA-HIGH FREQUENCY THERAPY. *(Rus.)* Korepanov, A. M. (Izhevsk Med. Inst., USSR). *Sov. Med.* (6):101-105, 1973.

5421 ACTIVITY OF INTESTINAL ENZYMES IN ANIMALS WITH SONNEI KERATOCONJUNCTIVITIS AND IN PATIENTS WITH ENTEROCOLITIS AND DYSENTERY. *(Rus.)* Nedopriadko, D. M. (Uzhgorod Br., Odessa Inst. Balneother., USSR). *Zh. Mikrobiol. Epidemiol. Immunobiol.* (10):100-105, 1973.

See also, 5444, 5450, 5622, 5636, 5645, 5649.

GASTROINTESTINAL DISEASES

ESOPHAGUS

5422 THE DISTAL ESOPHAGEAL SPHINCTER AND ITS RELATIONSHIP TO GASTROESOPHAGEAL REFLUX. *(E.)* Thurer, R. L.; Demeester, T. R.; Johnson, L. F. (Navy Regional Med. Ctr., Honolulu, Haw.). *J. Surg. Res.* 16(4):418-423, 1974.

In this study pH and manometric measurements across the distal esophageal sphincter were obtained on 159 patients. Both antegrade and retrograde passage of the catheter assembly were made in 77 patients. The remaining 82 patients had only retrograde studies. The results indicate the variability of sphincter data when obtained by antegrade and retrograde techniques. Sphincter data were evaluated against the standard acid reflux test. It was thus shown that the distal esophageal sphincter resting pressure is quantitatively related to reflux and that the majority of patients who reflux have distal esophageal sphincter resting pressures greater than 10 mm Hg. The presence of reflux was related to the antegrade pH gradient and the antegrade modified Tuttle test. The quantitative character of these measurements make their clinical use for determining the presence of reflux impractical. It was concluded that esophageal manometry is clinically useful only in locating the position of the sphincter prior to doing the standard acid reflux test, evaluating the presence of motility abnormalities, and determining the effectiveness of both medical and surgical therapy designed to increase sphincter pressure.

5423 PATHOPHYSIOLOGY OF ACHALASIA OF THE CARDIA. *(E.)* Misiewicz, J. J. (Central Middlesex Hosp., London, England). *Postgrad. Med. J.* 50(582): 207-208, 1974.

The symptoms and signs of achalasia are due to the loss of ganglion cells in the body of the esophagus, leading to dilation and loss of peristaltic activity. The data pertaining to the lower esophageal sphincter are still somewhat conflicting. The ganglion cells may be absent, but pharmacological evidence suggests denervation to be preganglionic. The classic view of a normotensive, nonrelaxing achalasic sphincter has been challenged by manometric studies performed with perfused open-ended tips. Studied with this technique, the achalasic sphincter appears to be markedly hypertensive and to retain a limited, but distinct ability to relax. Despite high sphincteric pressures, serum gastrin levels were normal in 19 patients with achalasia, and the sphincter relaxed when the gastric antrum was acidified. Supersensitivity of the achalasic sphincter to exogenous gastrin I was also demonstrated.

5424 THE ASSOCIATION BETWEEN WEBS, IRON AND POST-CRICOID CARCINOMA. *(E.)* Chisholm, M. (Roy. South Hants Hosp., Southampton, England). *Postgrad. Med. J.* 50(582):215-219, 1974.

Over a 15-yr period a follow-up study was made of 72 patients with post-cricoid webs. More than ½ had iron deficiency anemia at diagnosis, a further 10% were iron deficient on investigation, and a past history of iron deficiency anemia was noted in 21%. Thus, a definite link between iron deficiency and a post-cricoid web was established in 88%. Associated conditions in the 72 patients included a high incidence of thyroid disease and malignancies (15% each). Of the 11 patients with malignancies, 6 had a carcinoma in the upper gastrointestinal tract. In a prospective study, patients with iron deficiency anemia (168), healthy controls (98), and patients with a variety of disorders previously shown to coexist with a post-cricoid web (166) were examined for evidence of a web by cinefluorography of swallowing. Only 10% of patients with iron deficiency had post-cricoid webs, but 27 of 32 patients with a web had evidence of iron deficiency. Web patients had increased frequency of angular stomatitis and edentia, thyroid disease, and thyroid cytoplasmic antibodies compared to patients with iron deficiency anemia without a web. These studies support an association between iron deficiency, post-cricoid webs, and post-cricoid carcinoma. The mechanism by which these changes are produced is not yet understood.

5425 HIATAL HERNIA AND CHRONIC UNREMITTING ASTHMA. *(E.)* Friedland, G. W.; Yamate, M.; Marinkovich, V. A. (Stanford Univ. Sch. Med., California). *Pediatr. Radiol.* 1(3):156-160, 1973.

5426 TUBERCULOSIS OF THE ESOPHAGUS. *(Fr.)* Cornet, A.; Choubrac, P.; Barbier, J. P.; Francois, C.; Carnot, F. (Laennec Hosp., Paris, France). *Ann. Gastroenterol. Hepatol.* 9(4):339-348, 1973.

5427 ESOPHAGEAL DIVERTICULOSIS AS A CAUSE OF RECURRENT BLEEDING. *(Pol.)* Wenderlich, W.; Szulc, S. (Acad. Med., Bialystok, Poland). *Wiad. Lek.* 26(14):1349-1351, 1973.

5428 ESOPHAGEAL DISEASE. *(Fl.)* Vantrappen, G. (St. Rafael Univ. Hosp., Louvain, Belgium). *Tijdschr. Geneesk.* 29(13):605-609, 1973.

5429 RESULTS OF SURGICAL TREATMENT OF MEGA-ESOPHAGUS: SEVENTY-TWO CASES. *(Fr.)* Maillet, P.; Micol, P.; Parsal, J. P.; Viard, H.; Favre, J. P. (Red Cross Hosp., Lyon, France). *Ann. Chir.* 27(6):579-586, 1973.

5430 GASTROPERICARDIAL FISTULA - A COMPLICATION OF HIATUS HERNIA. *(E.)* Monro, J. L.; Nicholls, R. J.; Hatley, W.; Murray, R. S.; Flavell, G. (London Hosp., Whitechapel, England). *Br. J. Surg.* 61(6):445-447, 1974.

5431 EXPERIMENTAL TREATMENT OF CORROSIVE ESOPHAGEAL BURNS. *(E.)* Reyes, H. M.;

Lin, C. Y.; Schlunk, F. F.; Replogle, R. L. (Univ. Chicago Pritzker Sch. Med., Ill.). *J. Pediatr. Surg.* 9(3):317-328, 1974.

5432 RESISTANT ESOPHAGEAL STENOSIS ASSOCIATED WITH REFLUX AFTER REPAIR OF ESOPHAGEAL ATRESIA: A THERAPEUTIC APPROACH. *(E.)* Pieretti, R.; Shandling, B.; Stephens, C. A. (Hosp. Sick Children, Toronto, Canada). *J. Pediatr. Surg.* 9(3):355-358, 1974.

5433 LOWER OESOPHAGEAL SPHINCTER: THERAPEUTIC IMPLICATIONS. *(E.)* Salter, R. H. (Cumberland Infirm., Carlisle, England). *Lancet* (7853):347-349, 1974.

5434 BLEOMYCIN ALONE AND IN COMBINATION WITH METHOTREXATE IN THE TREATMENT OF CARCINOMA OF THE ESOPHAGUS. *(It.)* Tancini, G.; Bajetta, E.; Bonadonna, G. (Natl. Inst. Tumor Res., Milan, Italy). *Tumori* 60(1):65-71, 1974.

5435 SCLERODERMA AND THE ESOPHAGUS. *(Fr.)* Lortat-Jacob, J. L.; Giuli, R.; Estienne, B.; Duperrat, B.; Conte-Marti, J. (Beaujon Hosp., Clichy, France). *Bull. Acad. Natl. Med. (Paris)* 157(8):663-665, 1973.

5436 ESOPHAGOPLASTY USING THE STOMACH. *(Pol.)* Rogalski, E.; Knast, W.; Kolodziej, J. (Clin. Thoracic Surg., Wroclaw, Poland). *Pol. Przegl. Chir.* 45(11):1327-1331, 1973.

5437 ONE CASE OF ADENOCARCINOMA OF THE UPPER THIRD OF THE ESOPHAGUS DEVELOPING IN ECTOPIC GASTRIC TISSUE. *(It.)* Clemente, C. (Natl. Inst. Tumor Res. Treatment, Milan, Italy). *Tumori* 60(1):17-24, 1974.

5438 LONG-TERM RESULTS OF ONE-STEP SURGERY FOR EXCISION OF ESOPHAGEAL DIVERTICULA. *(Pol.)* Misterka, S. (Acad. Med., Wroclaw, Poland). *Wiad. Lek.* 27(1):15-20, 1974.

5439 BENIGN TUMORS OF THE ESOPHAGUS: SEVEN CASES. *(Sp.)* Segal, J. E.; Waciarz, M.; Ferreira, J. A.; Albanese, A. R.; Pinchuk, L.; Schlossberg, R.; Meeroff, M. (Metropolitan Sanit., Buenos Aires, Argentina). *Rev. Esp. Enferm. Apar. Dig.* 42(6):647-668, 1974.

5440 CYLINDRICAL EPITHELIUM COVERING THE DISTAL ESOPHAGUS (BARRETT'S SYNDROME). *(Ger.)* Wienbeck, M.; Heitmann, P.; Dombrowski, H.; Martini, G. A. (Med. Clin., Univ. Marburg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:821-822, 1973.

See also, 5388, 5394, 5699, 5712, 5729.

STOMACH

5441 RECURRENT ULCERATION AFTER GASTROENTEROSTOMY OR PYLOROPLASTY WITH COMPLETE AND INCOMPLETE VAGOTOMY. *(E.)* Gillett, D. J.; de Burgh, M. M. (Repatriation Gen. Hosp., Concord, New South Wales, Australia). *Am. J. Surg.* 127(6):650-652, 1974.

The relative value of gastroenterstomy and pyloroplasty as drainage procedure after vagotomy was examined in 191 patients with a mean follow-up period of more than 4 years. The over-all recurrence rate was 7% (13 of 171), with 5% recurrence (7 of 124) after gastroenterostomy and 9% (6 of 67) after pyloroplasty. In patients who had incomplete vagotomy, the rate of recurrent ulceration was 10% (3 of 30) after gastroenterostomy and 17% (3 of 18) after pyloroplasty. These figures fail to show any significant difference between rates of recurrent ulceration after either drainage procedure, even with incomplete vagotomy. Therefore, there is no reason to prefer one procedure over the other on a basis of recurrent ulceration.

5442 THE EXPERIMENTAL PRODUCTION OF GASTRIC ULCERS BY INDUCED MUSCLE SPASM. *(E.)* Qvist, G.; Dormandy, J.; Brown, C.; Slome, D.; Scott, G. B. D. (Roy. Coll. Surg. England, London). *Br. J. Surg.* 61(4):259-263, 1974.

A technique is described for the experimental production of gastric ulcers in dogs, by producing forceful spasmodic and longer localized muscle contractions due to intermittent stimulation by means of electrodes implanted in the stomach muscle. The stimulator is attached to the animal's back. Following some early technical failures due to stenosis and stasis, an adequate stimulus was applied for 2-3 weeks in 16 animals. In 13 cases macroscopic lesions developed in the stimulated area, varying from frank perforation to superficial erosions. Confirmation was provided by barium meal examinations and histologic observation. The responsible mechanism may be a localized ischemia as seen by blanching of the contracted area due to the increased strength and duration of the muscle spasms, thereby predisposing to necrosis and ulceration of the mucosa and the more superficial layers of the stomach wall.

5443 MUCOUS SUBSTANCE AND ENZYME HISTOCHEMISTRY OF NON-NEOPLASTIC AND NEOPLASTIC GASTRIC EPITHELIUM IN MAN. *(E.)* Kobori, O.; Oota, K. (Fac.

Med., Univ. Tokyo, Japan). *Acta Pathol. Jap.* 24(1): 119-130, 1974.

Neoplastic gastric epithelium from resected stomachs of 100 patients with gastric carcinoma was examined and gastric tissue strips were analyzed for 7 kinds of enzymes, including dehydrogenases, phosphatases, and lysosomal enzymes. Non-neoplastic gastric epithelium and other tissue from 20 stomachs resected from ulcer patients served as controls. Histologically, the tumors consisted of 30 well-differentiated, 47 moderately differentiated, and 23 undifferentiated adenocarcinomas. Since it has been shown that some of the well-differentiated gastric carcinomas contained epithelial elements histocytologically closely resembling intestinal epithelial cells, e.g. brush borders, the concept of intestinal and diffuse types of gastric carcinoma was postulated. Enzyme analysis here showed that combination of alkaline phosphatase and aminopeptidase was invariably positive in intestinal epithelium, benign or malignant, and was never found under other conditions. On the basis of this, the 100 gastric carcinomas were divided into 44 intestinal epithelial and 56 non-intestinal epithelial types. The percentages of the 44 histochemically-classified intestinal type carcinomas were correlated to the tubular structural differentiation of the neoplasms as follows: 46.7% of the histochemically identified intestinal adenocarcinomas (14 of 30 morphologically well-differentiated carcinomas) showed exclusively papillo-tubular formation; 43.5% (10 of 23 undifferentiated) had an infiltrating or cord-like pattern; and 42.6% (20 of 47 moderately differentiated) exhibited a mixture of the above 2 tubular structural arrangements. There is, apparently, no direct correlation between enzymatic characteristics as to intestinal or non-intestinal types and morphological tubular differentiation. It is suggested that quantitative studies of products of human neoplasms, i.e. enzymes or hormones, can clarify tumor cell differentiation better than morphological or histological examination.

5444 THE DETECTION OF AN ANTIGEN PRESENT IN GASTRIC CARCINOMA. *(E.)* Hocking, W.; Epps, A. C.; Akdamar, K. (Tulane Univ. Sch. Med., New Orleans, La.). *Am. J. Dig. Dis.* 19(6):537-546, 1974.

Studies to detect antigenic sulfoglycoproteins using indirect immunofluorescence and counterimmunoelectrophoresis were performed on 32 gastric biopsies and on 36 gastric aspirations. Patients with gastric carcinoma, lymphoma, benign gastric lesions, as well as those without evidence of gastric disease were examined. Specific antisera to sulfoglycoproteins found in aspirates of gastric carcinoma patients were produced in rabbits and later absorbed to increase specificity. Fluorescent staining of the cell membrane was observed in tissues of gastric carcinoma patients. In biopsies from patients with other forms of gastric pathology as well as normal gastric mucosa, a more diffuse fluorescent staining was noted. Counterimmunoelectrophoresis demonstrated a single precipitin band in all aspirates from patients with gastric carcinoma, in 1 patient with lymphoma, and in 1 patient with gastric polyps showing atypical hyperplasia. The remaining aspirates produced no precipitin bands. Results of this study suggest that counterimmunoelectrophoresis has greater diagnostic value than the indirect immunofluorescent technique for the detection of gastric sulfoglycoproteins, and therefore this method may prove useful in the diagnosis of gastric carcinoma. The high rate of positivity in patients with confirmed gastric carcinoma and the low rate in patients without carcinoma indicate that detection of gastric sulfoglycoprotein may be a useful adjunct to the procedures currently available for the diagnosis of gastric lesions. Detection of sulfoglycoprotein may prove particularly valuable in the distinction of benign gastric ulcers from ulcerated carcinoma.

5445 IMMUNOREACTIVE GASTRIN COMPONENTS IN HUMAN SERUM. *(E.)* Rehfeld, J. F.; Stadil, F.; Vikelsoe, J. (Bispebjerg Hosp., Copenhagen, Denmark). *Gut* 15(2):102-111, 1974.

Sephadex gel filtration and aminoethylcellulose chromatography were used to determine the apparent molecular size and charge of immunoreactive gastrin components in sera from patients with pernicious anemia or gastrinomas (the Zollinger-Ellison syndrome). The following serum components were identified: (1) a monophasic component I similar in size to proinsulin which was converted into "little" gastrin I by trypsin digestion; (2) a biphasic component II, corresponding to "big" gastrins I and II (Gregory and Tracy); (3) a biphasic component III corresponding to "little" gastrins I and II (Gregory and Tracy); and (4) a biphasic component IV, corresponding to "minigastrins" I and II (Gregory and Tracy). "Big, big" gastrin, a plasma component found in the void volume of the Sephadex G-50 column by Yalow and Berson was undetectable in the sera investigated. A component in gastrinoma and antral mucosa extracts corresponding in size to "big, big" gastrin was detectable by the assay; the "big, big" gastrin fraction from gastrinoma tissue was heterogenous, with components of apparent molecular weights of 30,000-100,000. It is concluded that serum gastrin circulates in the form of at least 4 components, of which the 3 smaller ones are in pairs.

5446 DUODENO-GASTRIC REFLUX AND ACID SECRETION IN PATIENTS WITH SYMPTOMATIC HIATAL HERNIA. *(E.)* Stol, D. W.; Murphy, G. M.; Collis, J. L. (Univ. Hosp., Rotterdam, Netherlands). *Scand. J. Gastroenterol.* 9(1):97-101, 1974.

Duodeno-gastric reflux and acid secretion were studied in 32 symptomatic hiatal hernia patients and in 13 controls. The duodeno-gastric reflux was measured by colorimetric determinations of bile acid concentrations in fasting gastric juice. Acid secretion was measured by titration of gastric juice before and after stimulation of the subjects with pentagastrin. The concentration of total bile acids in the stomach was increased in the hiatal hernia patients, indicating the presence of duodeno-gastric reflux.

Elevation of the basal acid output also was prounced in the hiatal hernia group, with a slight increase in peak acid output. An increase in both bile reflux and basal acid output appeared to be correlated with severity of the illness. A preliminary examination of the individual bile acid fractions present in the gastric juice suggested that samples from patients with stricture formation contain a smaller proportion of glycine conjugates than those from control subjects.

5447 INTESTINAL METAPLASIA OF THE GASTRIC MUCOSA. ENDOSCOPIC RECOGNITION AND REVIEW OF THE LITERATURE. *(E.)* Korn, E. R. (Scripps Clin., Res. Fdn., La Jolla, Calif.). *Am. J. Gastroenterol.* 61 (4):270-275, 1974.

Endoscopic recognition of intestinalization of the gastric mucosa (the presence in the gastric mucosa of intestinal epithelium) is advocated, using the Olympus GIF fiberoptic gastroscope with the distal ends of its fiberoptic bundles recessed a short distance behind the end of the scope. This enables the observer to obtain excellent close-up views of fine mucosal detail, including the villous pattern of the duodenal mucosa. In a patient with gastric ulcer, gastroscopic examination of mucosa surrounding the ulcer appeared identical to that of normal duodenal mucosa, and gastric biopsy study corroborated the intestinalization. If the ulcer is a metaplastic lesion, the stimulus favoring differentiation in the direction of intestinal epithelium is chronic irritation, such as is seen in gastritis. The frequency of this change in benign lesions is much less than in carcinoma, and the frequency of intestinalization also increases with age and with the extent of gastric mucosa studied. The relationship between gastric carcinoma and intestinalization of the gastric mucosa has been emphasized by the high frequency of association of these 2 lesions. Sixty to 100% of patients with carcinoma of the stomach have had associated intestinalization. The distribution of intestinal metaplasia in the stomach is similar to that of carcinoma. Fifty percent of all invasive carcinomas of the stomach are of the intestinal cell type. However, metaplastic epithelium has some variability in mucin reactions and ultrastructure similar to, but less extensive than, tumor cells. Histochemistry has also demonstrated the similarity of the metaplastic cells to those of normal small intestine. The ability to recognize areas of intestinal metaplasia endoscopically and to direct biopsy forceps to these areas are important in better delineating the identification of this lesion.

5448 FACTORS INFLUENCING THE DEVELOPMENT OF INDOMETHACIN-INDUCED INTESTINAL ULCERS IN THE RAT. (38060) *(E.)* Volterra, G.; Pisanti, N.; Meli, A. (Res. Labs., A. Menarini Pharmaceuticals, Florence, Italy). *Proc. Soc. Exp. Biol. Med.* 146(1): 146-152, 1974.

The influence of sesame oil, a fat-free diet, and increased bile flow on indomethacin-induced intestinal ulcers was studied in male and female Wistar-Morini albino rats. A program of fasting 17 hr before and 7 hr after indomethacin was adopted for maximum protection against ulceration. Indomethacin, suspended in an aqueous vehicle, was administered by gavage at several dose levels in a constant volume of 5 ml/kg. 1-Phenylpropanol (400 mg/kg) was solu-suspended either in sesame oil or in an aqueous vehicle and administered in a constant volume (5 ml/kg) 4 hr after indomethacin as a choleretic agent. The animals were fed either a regular diet or a fat-free diet over a 10-day period before the experiments. Starvation significantly reduced the incidence of indomethacin-induced intestinal ulcers in the rats fed a regular diet, but the feeding schedule did not affect ulcer formation in those fed a fat-free diet. The incidence of indomethacin-induced intestinal lesions was lower in the latter animals. Independent of feeding schedule and nature of diet, 1-phenylpropanol in aqueous suspension failed to enhance the ulcerogenic properties of indomethacin but when given as an oily solution, 1-phenylpropanol promoted ulcer formation in test animals over and above that observed following the administration of sesame oil. Within the fat-free diet groups, sesame oil potentiated ulcer formation both in fasted and unfasted animals, but in the regular diet group only during fasting periods. Thus, the effects of sesame oil facilitation and fat-free diet prevention on indomethacin-induced intestinal ulcers are independent of bile flow and/or composition as shown by results here.

5449 HISTOLOGY AND HISTOGENESIS OF EARLY GASTRIC CARCINOMAS WITH FLAT MUCOSAL ELEVATIONS. *(E.)* Nagayo, T. (Aichi Cancer Ctr., Nagoya, Japan). *Acta Pathol. Jap.* 24(2):249-272, 1974.

To differentiate between early gastric carcinomas and non-malignant atypical epithelial growths with similar gross and microscopic characteristics, 648 cases of early gastric carcinoma were examined grossly and histologically. Circumscribed, sessile, and flatly elevated early carcinomas were found in 5.5% of these. Most of the lesions showed highly differentiated, tubular adenocarcinomas composed of columnar epithelium and accompanied by pronounced intestinal metaplasia in the cancer-bearing pyloric mucosa. Histological study showed that the elevated lesions were not due to primary growth of the carcinoma but rather to reactive growth of the non-neoplastic gastric mucosa in response to the developing carcinoma. Occasionally, the histological features of the lesions seemed to lie between benign and malignant types. These were termed border-line lesions; in general, they were smaller than carcinomas. Microscopically, upper layers of the elevated mucosae always contained diffuse but regularly placed, darkly stained tubules running vertically to the muscularis mucosae. In lower layers, cystic dilations of the gastric glands were almost always visible among non-atypical orthochromatic hyperplastic glands. Downward proliferation of atypical tubules could be seen but, unlike in cases of well-differentiated adenocarcinomas, the layers of the affected mucosa were infrequently occupied by atypical tubules. The nucleo-cytoplasmic ratio was smaller and cytoplasm was more clearly recognizable along the glandular lumina in the epithelium of the border-line lesion than in the carcinomas.

5450 ANGIOGRAPHY IN GASTRIC TUMOURS. *(E.)* Efsen, F.; Fischerman, K. (Rigshosp., Copenhagen, Denmark). *Acta Radiol. [Diagn.] (Stockh.)* 15(2): 193-197, 1974.

Preoperative celiac and superior mesenteric angiographies were carried out in 15 patients (44-82 yr old) with histologically verified gastric tumors. No growths below 3 cm in diameter were present in this series; and in all sizes observed, the most constant angiographic sign was a change in the caliber of small arteries and parenchymatous accumulation of contrast medium. Gastric tumors more than 5 cm in diameter had more extensive angiographic changes than those of smaller diameter; no relation was noted between macroscopic and angiographic sizes of the tumors. Sarcomatous tumors (reticulosarcomas and leiomyomas) presented few changes compared with carcinomas, but different types of carcinomas could not be identified angiographically. The angiographies did not supply information regarding tumor operability. Thus, it was not possible, even by a detailed assessment of the angiographic changes, to estimate the size or the operability of a gastric neoplasm.

5451 CARCINOMA OF THE STOMACH FOLLOWING PARTIAL GASTRECTOMY FOR BENIGN GASTRODUODENAL LESIONS. *(E.)* Nicholls, J. C. (Charing Cross Hosp. (Fulham), London, England). *Br. J. Surg.* 61(3):244-249, 1974.

Thirty-six patients (30 men and 6 women, aged 33-70 yr) with gastric carcinoma who had previously undergone partial gastrectomy for benign lesions were studied. Of these patients, 28 underwent the gastrectomy at St. James' Hospital, London. Of the 36 patients, the original pathology was gastric ulcer in 25 cases, duodenal ulcer in 6, duodenal diverticulum in 1, gastric and duodenal ulcer in 1, and unknown in 2 cases. Based on this series, the incidence of carcinoma following partial gastrectomy is 1 in 76 gastric ulcer patients compared with 1 in 865 duodenal ulcer patients. The average time between gastrectomy and diagnosis of carcinoma was 8½ yr in the St. James' group and 13 yr for the 8 patients treated elsewhere. Only 2 of the 23 who underwent surgery for their carcinoma survived for more than 5 yr. Partial gastrectomy for gastric ulceration does not protect against subsequent gastric cancer; however, it will remove treatable early carcinoma, which may easily be mistaken for a benign gastric ulcer. Despite the poor prognosis, thorough investigation of the postgastrectomy patient with early surgical treatment is warranted by the occasional long-term survivor.

5452 DOUBLE PYLORUS: A HYPOTHESIS CONCERNING ITS PATHOGENESIS. *(E.)* Farack, U. M.; Goresky, C. A.; Jabbari, M.; Kinnear, D. G. (Montreal Gen. Hosp., Quebec, Canada). *Gastroenterology* 66(4): 596-600, 1974.

Two cases of double pylorus are reported, one involving a complete double pyloric canal in a 75-yr-old woman and the other a gastro-gastric channel in a 30-yr-old man. The former patient presented with upper gastrointestinal bleeding but with no epigastric pain, vomiting, or history of ulcer disease. Gastroscopy revealed two channels between the stomach and duodenum, with a characteristic septal impression between the two. A nonbleeding ulcer was seen in the inferior canal. A biopsy taken from the proximal end of the tissue bridge between the two channels showed intestinalization of the mucosa. Review of previous radiographs indicated that the lesion had been acquired. The patient was discharged on an ulcer diet and decreased dose of the prednisone. The second patient was admitted to the hospital because of recurrent hematemesis, with nausea, epigastric fullness, and dull epigastric pain. An upper gastrointestinal series revealed a distended stomach with a prepyloric ulcer and an ulcer at the distal lesser curve. Endoscopy demonstrated two openings, at the distal lesser curvature, separated by a tissue bridge. Continuity between the two openings was demonstrated, as was a channel connecting the two ulcers. The connective channel was lined by normal gastric mucosa. The patient has been well since subtotal gastrectomy. It is suggested that the formation of a double pylorus involves an activation of a prepyloric ulcer, deep penetration into the wall of the pylorus, and perforation into the duodenum.

5453 AN OPPORTUNITY TO PREDICT MALIGNANT TRANSFORMATION OF GASTRIC POLYPS. *(Rus.)* Kirillova, R. A. (Riga Med. Inst., USSR). *Vestn. Khir.* 111(9):32-32, 1973.

5454 EXPERIMENTAL STUDIES ON THE PATHOGENESIS AND TREATMENT OF MALLORY-WEISS SYNDROME. *(Ger.)* Bellman, H.; Hartig, W.; Wohlgemuth, B.; Brand, G.; Kothe, W.; Scheuner, G.; Hutschenreiter, J.; Haupt, R.; Rauchfuss, E.; Splith, G.; Staffa, G.; Engel, C.; Deckert, F.; Schonfelder, M.; Joseph, K. S.; Winiecki, P. (Surg. Clin., Karl Marx Univ., Leipzig, Germany). *Z. Exp. Chir.* 6(3):190-193, 1973.

5455 DEFORMATION OF THE STOMACH IN CANCER. *(Rus.)* Vlasov, P. V. (Inst. Med. Radiol., Obninsk, USSR). *Vestn. Rentgenol. Radiol.* (2):25-1973.

5456 A GASTRIC LOCATION OF WALDENSTROM'S DISEASE: COMPARISON OF RADIOLOGICAL AND ENDOSCOPIC FINDINGS. *(Fr.)* Auche, Y.; Bernard, J. P.; Faivre, J. (St. Andre Hosp., Bordeaux, France). *Ann. Gastroenterol. Hepatol. (Paris)* 9(4): 355-358, 1973.

5457 ENDOSCOPIC STUDY OF GASTRIC CANCER AFTER GASTRECTOMY FOR ULCER. *(Fr.)* Moulinier, B.; Lambert, R.; Grenier-Boley, P.; Ruet, D.; Truchot, R. (Edouard Herriot Hosp., Lyon, France). *Ann. Gastroenterol. Hepatol. (Paris)* 9(4):359-366, 1973.

5458 GENERAL AND METABOLIC SEQUELAE OF GASTRECTOMY. *(Fr.)* Guerre, J.; Gueroult,

N. (Cochin Hosp., Paris, France). *Ann. Gastroenterol. Hepatol. (Paris)* 9(4):377-400, 1973.

5459 POSTGASTRECTOMY SYNDROMES: INTERNAL MEDICAL ASPECTS. *(Fl.)* Broeckx, J. (St. Rafael Univ. Hosp., Louvain, Belgium). *Tijdschr. Geneesk.* 29(13):624-634, 1973.

5460 POSTGASTRECTOMY SYNDROME: SURGICAL ASPECTS. *(Fl.)* Beckers, J. (St. Rafael Univ. Hosp., Louvain, Belgium). *Tijdschr. Geneesk.* 29(13):635-636, 1973.

5461 GASTRIC LYMPHOSARCOMA LIMITED TO THE MUCOSA AND SUBMUCOSA SIMULATING THE MACROSOMAL APPEARANCE OF EARLY CANCER TYPE IIc. *(E.)* Seifert, E.; Braschke, M.; Glatzel, H.; Ostertag, H. (Med. Sch. Hannover, Germany). *Endoscopy* 6(1):51-55, 1974.

5462 CATECHOLAMINE CONTENT OF GASTRIC JUICE IN NORMAL SUBJECTS AND IN SOME DISEASES OF THE ALIMENTARY TRACT. *(Rus.)* Grokhovskii, L. P. (Inst. Obstet. Gynecol., Leningrad, USSR). *Ter. Arkh.* 45(8):57-60, 1973.

5463 CLINICAL AND RADIOLOGICAL DIAGNOSIS OF BENIGN NONEPITHELIAL TUMORS OF THE STOMACH. *(Rus.)* Rozenshtraukh, L. S.; Sipukhin, Ia. M.; Rybakova, N. I.; Popova, Z. P.; Lukichev, P. M.; Tikhonova, L. P. (Inst. Exp. Clin. Oncol., Moscow, USSR). *Vestn. Rentgenol. Radiol.* (2):14-21, 1973.

5464 THE PORTAL SYSTEM AND GASTRIC HYPERSECRETION: PATHOPHYSIOLOGICAL HYPOTHESES. *(Fr.)* Gislon, J.; Dubrasquet, M. (Bichat Hosp., Paris, France). *Biol. Gastroenterol. (Paris)* 7(1):65-81, 1974.

5465 RELATION BETWEEN AGE, GASTRIC SECRETION, AND GASTRITIS. *(Ger.)* Arendt, R.; Hauzeur, F. (Med. Clin., Univ. Rostock, Germany). *Z. Alternsforsch.* 27(2):161-167, 1973.

5466 ORAL ANTIBIOTIC THERAPY IN GASTRECTOMIZED PATIENTS. *(Ger.)* Lode, H.; Frisch, D.; Naumann, P. (Med. Clin., Steglitz Clin., Free Univ., Berlin, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:837-839, 1973.

5467 SOME FUNCTIONAL AND MORPHOLOGICAL PARALLELS IN CHRONIC ATROPHIC GASTRITIS. *(Rus.)* Semenchuk, D. D.; Persidskii, V. Ia. (Inst. Probl. Oncol., Kiev, USSR). *Vrach. Delo* (5):93-97, 1974.

5468 COMPLICATIONS AND SEQUELAE RESULTING FROM CONSERVATIVE OPERATIONS. *(Fr.)* Garbay, M. (Corentin-Celton Hosp., Issy-les-Moulineaux, France). *Ann. Gastroenterol. Hepatol. (Paris)* 9(5):489-495, 1973.

5469 SLOW EVOLUTION OF A GASTRIC LYMPHOMA: ANATOMICAL AND CLINICAL STUDY OF ONE CASE. *(Fr.)* Lhuintre, Y.; Degiovanni, E.; Medelsi, M. (Bretonneau Hosp. Ctr., Tours, France). *Ann. Gastroenterol. Hepatol. (Paris)* 10(1):31-39, 1974.

5470 GASTRIC EOSINOPHILIC GRANULOMA. *(Pol.)* Kortas, J.; Chojnacki, J. (Pomeranian Acad. Med., Szczecin, Poland). *Wiad. Lek.* 27(3):269-272, 1974.

5471 SPECIFIC INVOLVEMENT OF THE STOMACH IN RECENT SECONDARY SYPHILIS. *(Rus.)* Shubinskii, N. A.; Likhachov, A. N. (no affil.). *Vrach. Delo* (5):111-112, 1974.

5472 RELATION BETWEEN MUCOSAL MORPHOLOGY, PEAK ACID OUTPUT (PAO), AND THE SERUM GASTRIN LEVEL IN PATIENTS WITH HYPER-, NORMO-, HYPO-, AND ACHLORHYDRIA. *(Ger.)* Miederer, S. E.; Stadelmann, O.; Kaess, H.; Elster, K. (Med. Polyclin., Univ. Bonn, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:823-825, 1973.

5473 GASTRIC LYMPHOMA: DIAGNOSTIC AND THERAPEUTIC PROBLEMS. *(Ger.)* Rosch, W.; Hartwich, G. (Med. Clin., Univ. Erlangen, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:839-841, 1973.

5474 STUDY OF GASTRIC DYNAMICS: MANOMETRIC AND ENDOSCOPIC FINDINGS. *(It.)* Catalano, F.; Mangiafico, F.; Monello, S.; Mazzone, O. (Inst. Clin. Gen. Med. Med. Therap., Univ. Catania, Italy). *Arch. Ital. Mal. App. Dig.* 37(2):113-121, 1973.

5475 TOTAL GASTRECTOMY FOR CANCER OF THE STOMACH. *(E.)* Henrichsen, S.; Kronborg, O.; Brenoe, E. (Bispebjerg Hosp., Copenhagen, Denmark). *Acta Chir. Scand.* 140(2):147-150, 1974.

5476 POSTOPERATIVE DUODENOGASTRIC REFLUX: A CAUSE OF GASTRITIS AND SYMPTOMS. *(E.)* Keighley, M. R. B.; Asquith, P.; Alexander-Williams, J. (General Hosp., Birmingham, England). *Gut* 15(4):336, 1974.

5477 GASTRIC EPITHELIAL CELL TURNOVER AFTER ACUTE AND CHRONIC ALCOHOL INGESTION. *(E.)* Krasner, N.; Thomson, T. J.; Crean, G.; McNeil, C. (Stobhill Gen. Hosp., Glasgow, Scotland). *Gut* 15(4):336, 1974.

5478 SECRETIN RELEASE IN MAN AFTER INTRADUODENAL ACID. *(E.)* Bloom, S. R.; Ward, A. S.

(Middlesex Hosp., London, England). *Gut* 15(4):337, 1974.

5479 EVENTRATION OF THE DIAPHRAGM WITH GASTRIC PERFORATION. *(E.)* Katz, S. M.; Holgersen, L. O.; Bishop, H. C.; (no affil.). *J. Pediatr. Surg.* 9(3):411-412, 1974.

See also, 5106, 5387, 5388, 5390, 5396, 5402, 5406, 5413, 5430, 5480, 5499, 5600.

STOMACH

Peptic Ulcers

5480 GASTRIC CLEARANCE OF SERUM ALBUMIN IN NORMAL MAN AND IN CERTAIN GASTRODUODENAL DISORDERS. *(E.)* Brassinne, A. (Univ. Liege, Baviere Hosp., Belgium). *Gut* 15(3):194-199, 1974.

The measurements of the passage of albumin from the plasma to the gastric juice in the basal secretory state and during stimulated secretion in 41 normal volunteers (35 males, 6 females, 21 to 29 yr old) and in 19 patients are presented. There was no correlation between acid output and albumin leakage into the stomach in the normal volunteers as estimated from the measurement of non-dialysable radioactivity of the gastric juice after i.v. injection of radioiodinated serum albumin (100 µCi). For the 41 normal subjects, gastric clearance of serum albumin at the second hour was significantly lower than at the first hour with the respective means 1.71 ml/hr and 2.07 ml/hr. The serum albumin loss into the stomach amounted to 11.3% of its catabolism in normal man. In the 7 patients with duodenal ulcer, gastric clearance and catabolism of serum albumin were not significantly different from the control group. The same was true with the 3 gastric ulcer patients. In pernicious anemia (7 patients), the gastric clearance of serum albumin was significantly greater (3.72 ml/hr) than in the normal group. It accounted for the greater fractional catabolic rate of serum albumin in this disease and a lower level of albumin in serum. In the case of giant hypertrophic gastritis, albumin clearance was 6.22 ml/hr. It fell to 2.59 ml or 17% of the metabolic clearance after subtotal gastrectomy. In a woman with radiological giant rugae of the stomach, histamine-fast achlorhydria and hypoproteinemia, the gastric clearance of serum albumin was 5.6 ml/hr. The gastric clearance of serum albumin as determined by the single radial immunodiffusion method was similar to the one measured with ^{131}I-serum albumin. In 16 normal subjects and 5 patients with duodenal ulcer, the correlation coefficient between both methods applied simultaneously was 0.7896 for 43 basal samples and 0.5320 for 40 samples after stimulation. The correlation between both methods is considerably better for 12 one-hour samples of gastric juice from 2 pernicious anemia patients (0.9827). These results suggest: (1) that albumin is not secreted by the chief and parietal cells of the gastric mucosa but probably passes through the gastric wall between the mucosal cells, perhaps during the exfoliation of the surface epithelial cells; and (2) that the stomach is one of the sites of serum albumin breakdown, a fact that supports the view that the gastrointestinal tract plays a major role in the catabolism of serum albumin.

5481 ACQUISITION OF A PYLORIC SEPTUM OR PYLORIC DUODENAL FISTULA. *(E.)* Drapkin, R. L.; Otsuka, A. L.; Castellanos, H. L.; El Hindi, S.; Nowicka, H.; Levitan, R. (VA West Side Hosp., Chicago, Ill.). *Gastroenterology* 66(4):1234-1236, 1974.

The formation of a gastroduodenal fistula, an unusual complication of peptic ulcer, is reported here. A patient with active upper gastrointestinal hemorrhage and previous radiological evidence of duodenal deformity, was discovered to have a gastric ulcer. Nineteen days later, a pyloric septum was observed gastroscopically in the same area. The radiological examinations of the upper gastrointestinal tract were consistent with these endoscopic observations, and a prepyloric mucosal septum was found during surgery which was necessary because of recurrent hemorrhage. The formation of this prepyloric septum, an acquired lesion, in the patient appears to be the result of peptic ulcer with the formation of a fistulous tract connecting the pylorus to the duodenum.

5482 ANTRAL-GASTRIN-CELL HYPERPLASIA IN PEPTIC-ULCER DISEASE. *(E.)* Ganguli, P. C.; Polak, J. M.; Pearse, A. G. E.; Elder, J. B.; Hegarty, M. (Royal Infirm., Manchester, England). *Lancet* (7858):583-586, 1974.

Thirteen male patients with significant peptic ulcer disease were studied, including 2 with duodenal ulcer and 11 who developed recurrent ulceration after gastric surgery for duodenal ulcers. The average time to recurrence after surgery was 3.1 yr. Of the 11 patients, 10 had undergone truncal vagotomy and drainage and 1 had vagotomy and partial gastrectomy. Plasma gastrin was measured in each patient before and after meat-extract ('Oxo') test meal. In 6 patients (group A), the fasting plasma-gastrin was 497 pg/ml and in the other 7 (group B) it was 185 pg/ml. Peak gastrin concentrations after Oxo were 1304 and 405 pg/ml, resp. The integrated gastrin response was 2490 and 601 pg, resp. None of the patients had a pancreatic tumor at laparotomy. Each patient underwent a hemigastrectomy. A specific immunofluorescence technique was used to examine the gastrin (G) cells in the resected antrum. All patients with hypergastrinemia (group A) had numerous G cells in their antra, whereas group B patients had significantly fewer G cells. These differences in plasma-gastrin response and in the appearance of the antrum under immunofluorescence were striking and suggested that antral-G-cell hyperplasia may be a separate clinical entity.

5483 BACTERIOLOGY OF THE STOMACH IMMEDIATELY FOLLOWING VAGOTOMY: THE GROWTH OF Candida albicans.

(E.) Brooks, J. R.; Smith, H. F.; Pease, Jr., F. B. (Harvard Med. Sch., Boston, Mass.). *Ann. Surg.* 179(6):859-862, 1974.

A short term investigation of the gastric microorganism flora in 71 patients (44 male and 27 female) included an analysis of the gastric cultures taken from 63 patients during surgery and from 50 patients postoperatively. Although the intraoperative cultures were sterile in 43 of the cases (69%), the specific microorganisms encountered in 20 of the other cultures included: Alpha-hemolytic *Streptococcus* (18 out of 20 cases), *Staphylococcus epidermidis* (11 cases); *Candida* species (5 cases); *D. pneumoniae* (3 cases); *Neisseria* species (3 cases); *Lactobacillus* (2 cases); and *Citrobacter, Herellea vaginicola, Micoplasma*, *Micrococcus, Pseudomonas aeruginosa,* and *Staphylococcus aureus* (1 case each). In the postoperative period, 48 of the 50 patients cultured showed growth of organisms (96%). The specific microorganisms found in these cultures included: *Candida* species (39 cases); diphtheroids (16 cases); *Lactobacillus* (12 cases); Alpha-hemolytic *Streptococcus* (12 cases); *Staphylococcus epidermidis* (10 cases); *Mycoplasma* (8 cases); *Klebsiella* group (6 cases); *D. pneumoniae* (5 cases); *Escherichia coli* (4 cases); *Pseudomonas aeruginosa* (4 cases); *Neisseria* species (3 cases); *Citrobacter* (3 cases); Beta-hemolytic *Streptococcus* (3 cases); and *Micrococcus* (1 case). All patients with positive cultures intraoperatively had positive cultures postoperatively, but the variety and number of organisms increased. The elevation in the pH level over 3.0 for vagotomized patients correlates well with the bacterial proliferation noted within the stomach in the postoperative state. The presence of *Candida albicans* in a very large percentage of the stomachs of post-vagotomy patients is a new finding. Several of the patients had *C. albicans* organisms in the stools, but there was no correlation between this finding and the transient diarrhea that occurs in some 10% of patients following vagotomy. In none of these cases did systemic candidiasis occur. The experience with oral mycostatin therapy in several patients who had diarrhea and gastric candidiasis was inconclusive, with some patients improving, others not.

5484 EVALUATION OF COLLOIDAL BISMUTH (DE-NOL) IN THE TREATMENT OF DUODENAL ULCER EMPLOYING ENDOSCOPIC SELECTION AND FOLLOW UP.

(E.) Salmon, P. R.; Brown, P.; Williams, R.; Read, A. E. (Dept. Med., Bristol Roy. Infirm., England). *Gut* 15(3):189-193, 1974.

A double-blind, placebo-controlled trial of colloidal bismuth (De-Nol) (10 ml diluted with 15 ml water 6 times daily) was performed on 20 patients with active duodenal ulceration (10 patients receiving placebos and 10 the active medication) by employing endoscopic selection and follow up after a treatment period of 28 days. All patients admitted to the trial presented with dyspepsia of varying severity and duration. There was no significant difference in improvement of these symptoms between the recipients of placebos and bismuth. Endoscopically, a statistically significant difference was seen in the number of patients showing ulcer healing at 28-32 days in the bismuth group (9 out of 10) compared with the placebo group (3 out of 10). There were 7 completely healed ulcers in the treated group and only 1 in the placebo group. In a preliminary pilot study, no change in acid-base balance (arterial pH, $PaCo_2$, base excess, plasma bicarbonate, standard bicarbonate) was found in 5 healthy subjects (age range 25-35) treated with 50 ml colloidal bismuth compound (De-Nol) daily for 7 days. Similarly here, no adverse side effects were noted by any patients. Blackening of the stools was noted by some subjects and a slight ammoniacal odor by others, but neither was considered sufficiently unpleasant to prevent any subject from taking the prescribed dose. The results indicate that colloidal bismuth compound (De-Nol) increases the rate of healing of duodenal ulcers over a short follow-up period.

5485 THE DUMPING SYNDROME AND THE HYDROGEN ION CONCENTRATION OF THE GASTRIC CONTENTS.

(E.) Thomson, J. P. S.; Russell, R. C. G.; Hobsley, M.; Le Quesne, L. P. (Middlesex Hosp. Med. Sch., London, England). *Gut* 15(3):200-206, 1974.

The dumping provocation test (p.o. administration of 200 ml 50% dextrose) was performed on 40 patients (34 men and 6 women; average age 44 yr) who had undergone surgery for duodenal ulcers. Surgery consisted of vagotomy (truncal in 18, selective in 22) combined with a drainage procedure (Heineke-Mikulicz pyloroplasty in 18, gastroduodenostomy in 12, gastrojejunostomy in 10). Of the 27 examined shortly after surgery, 15 were studied before surgery. Any fall in plasma volume during the dumping provocation test was assessed by serial measurement of the hematocrit, and an insulin gastric secretion test was performed on each patient. Dumping symptoms varying in severity developed after meals in 20 operated patients. In all 20 patients, dumping symptoms were also produced by the dumping provocation test, which caused similar symptoms in 3 other patients who had no evidence of dumping after meals. There were no significant differences in the occurrence of dumping symptoms between patients who had truncal vagotomy and selective vagotomy, between patients with the 3 different types of drainage procedure, and between those patients who were studied after 6 months. After surgery there was a correlation between the occurrence of dumping symptoms following oral hypertonic glucose and the H^+ concentration of the gastric contents, both in the basal state and after insulin hypoglycemia. The lower the basal H^+ concentration and the lower the peak H^+ concentration after insulin hypoglycemia, the greater was the tendency to develop dumping symptoms. In patients with dumping syndrome, there was no significant difference between the basal and peak H^+ concentrations, while in asymptomatic patients the peak H^+ concentration was significantly higher. These findings, together with an analysis of the results with regard to Hollander's criteria, suggest that dumping symptoms are most likely to develop in patients with complete vagal innervation of the stomach. However, since Hollander's criteria do not take into account factors such as pyloric loss and duodenal reflux, which affect the H^+ concentration

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of the gastric juice, it is not possible to make a definite statement concerning the relation between the occurrence of dumping symptoms and the completeness of vagus nerve section. The occurrence of dumping symptoms after partial gastrectomy or simple gastrojejunostomy might be explained by more rapid gastric emptying resulting from a decreased gastric H^+ concentration or by decreases in gastric H^+ concentration resulting from the removal of the greater part of the parietal cell mass or reflux of alkaline intestinal contents into the stomach.

5486 KALLIKREIN-KININ SYSTEM IN POSTGASTRECTOMY DUMPING SYNDROME. *(E.)* Wong, P. Y. Talamo, R. C.; Babior, B. M.; Raymond, G. G.; Colman, R. W. (Boston City Hosp., Mass.). *Ann. Int. Med.* 80(5):577-581, 1974.

The kallikrein-kinin system was studied in 10 postgastrectomy patients, 5 with the dumping syndrome and 5 without symptoms. After drinking 220 ml of 45% glucose (test meal) none of the asymptomatic patients developed symptoms of the dumping syndrome, elevated levels of bradykinin, or prekallikrein activation; the mean blood pressure fall was not significant. The symptomatic group had headaches, lightheadedness, diarrhea, and a significantly decreased mean blood pressure of 19.4%. A rise in plasma bradykinin levels to above normal occurred in all patients. Two had activation of plasma kallikrein, manifested by a drop in prekallikrein and complete disappearance of kallikrein inhibitor; 1 of these 2 also had increased free kallikrein, showed by kinin release from kininogen. The mechanism of kinin release in the other 3 patients was unknown. These findings suggest that kinins may mediate some features of the dumping syndrome. In some patients, kinin release seemed to result from the formation of plasma kallikrein. In others, the exact mechanism of kinin release is unclear.

5487 LATE RESULTS OF BILATERAL SELECTIVE VAGOTOMY AND PYLOROPLASTY FOR DUODENAL ULCER: 5-9 YEAR FOLLOW-UP. *(E.)* DeMiguel, J. *Br. J. Surg.* 61(4):264-269, 1974.

Through a period of 4 yr, bilateral selective vagotomy and pyloroplasty were performed for duodenal ulcer on 135 patients (119 men and 16 women) without postoperative mortality. Elective operations were for intractable pain (116 patients) and pyloric stenosis (11 patients); emergency operations were for acute perforation (6 patients) and active massive hemorrhage (2 patients). Two unrelated deaths (coronary occlusion and carcinoma of the colon) occurred during the period of the survey and 2 other patients were lost to follow-up. The remaining 131 patients were followed up for a minimum of 5 yr and a maximum of 9 yr. The most frequent symptoms were milk intolerance (30 patients), epigastric fullness (29 patients), early dumping (19 patients) and mild diarrhea (24 patients). Only 1 case of moderate diarrhea was observed, and none of severe diarrhea. Food vomiting occurred in 2 patients; bile vomiting in 4; and hypoglycemia-like attacks in 3 patients. Recurrent duodenal ulcer was proved in 4.6% and highly suspected in 1.5%. Gastric ulcer was proved in 3.1%. Approximately 91% of the patients were classed as having a satisfactory result and 9% were unsatisfactory. Bilateral selective vagotomy is clearly effective in controlling ulcer diathesis in the long term, and it seems to lessen some of the side-effects of gastric surgery. For these reasons, consideration should be given to its use in the surgical treatment of duodenal ulcer.

5488 GASTRIC ACID RESPONSE TO SHAM FEEDING BEFORE AND AFTER RESECTION OF ANTRUM AND DUODENAL BULB IN DUODENAL ULCER PATIENTS. *(E.)* Knutson, U.; Olbe, L. (Sahlgrenska Hosp., Goteborg, Sweden). *Scand. J. Gastroenterol.* 9(2):191-201, 1974.

The gastric acid response to physiological vagal stimulation by 15-min sham feeding was studied in 25 duodenal ulcer patients with intact antrum and in 15 duodenal ulcer patients after resection of the antrum and duodenal bulb. In 5 patients sham fed before and after the resection, the peak acid response to sham feeding was reduced by 61% following resection. The antrum-bulb resection reduced by 47% the maximal acid response to betazole (2 mg/kg s.c.) or pentagastrin (90 μg/hr for 45 min. i.v., followed by 300 μg/hr for 45-60 min). In the nonresected patients, the peak acid response to sham feeding amounted to 53% of the maximal acid response to betazole or pentagastrin, while the postresection relation was 33%. The results indicate that the vagal release of gastrin from the antrum-bulb region contributes to, but is not essential for, the gastric acid response to physiological vagal activation in the ulcer patients. Furthermore, the marked reduction in the vagally activated secretion of acid following antrum-bulb resection in man seems to be due primarily to a general and irreversible decline in the acid secretory capacity and only to a minor extent to the elimination of the acid stimulatory effect of vagally released gastrin from the antrum-bulb region.

5489 HIGHLY SELECTIVE VAGOTOMY AND DRAINAGE FOR DUODENAL ULCER STENOSIS. *(E.)* El-Katib, Y.; Mashhoor, N. (Fac. Med., Cairo Univ., Egypt). *Br. J. Surg.* 61(3):241-243, 1974.

Thirteen patients with pyloric stenosis secondary to duodenal ulceration underwent highly selective vagotomy and gastroenterostomy. All 13 patients were men aged 32 to 55 yr. Preoperative preparation consisted of gastric lavage with normal saline twice a day and correction of any electrolyte disturbances and deficiencies. A gastric vagotomy was performed but the antrum was not denervated; the anterior and posterior nerves of Latarjet were left intact. A greater curvature gastroenterostomy followed. Postoperatively, gastric aspiration was continued for up to 72 hr, with oral fluids given at 48 hr. By 10 days postoperatively, there was complete gastric evacuation of a barium meal within 4 hr in 9 cases and within 6 hr in the remaining 4 cases. Within 2 weeks all patients were discharged, none having any sour eructations or vomiting. Insulin tests administered 3 weeks postoperatively were all negative. The patients were followed up for periods of 5 to 15 months; none showed symptoms of recurrent ulceration. This surgical program should be considered in the treatment of well-prepared patients.

5490 PHARMACOLOGICAL PROTECTION AGAINST SWINE STRESS ULCER. *(E.)* Norton, L.; Mathews, D.; Avrum, L.; Eiseman, B. (Denver Gen. Hosp., Colo.) *Gastroenterology* 66(4):503-508, 1974.

The ability of cholestyramine, methysergide, and methylprednisolone to protect against stress ulceration was evaluated in a swine hemorrhagic shock model. Twelve control piglets developed gastric ulcers within 48 hr of hemorrhagic shock. Cholestyramine (50 mg/kg in a liquid meal) administered 12 hr before hemorrhage prevented ulceration in 8 of 9 animals (89%), providing additional evidence that swine stress ulceration depends upon the reflux of bile into the stomach. When cholestyramine administration was delayed for 1 hr, only 2 of 5 swine were protected, suggesting that bile damage to the mucosa occurs rapdily. Prefeeding with methysergide (5 mg/kg), a serotonin antagonist, protected 2 of 4 piglets. Giving methysergide i.v. during shock afforded no protection to 4 other animals. Methylprednisolone given in high doses (15 mg/kg) i.v. to 5 piglets early in shock prevented ulceration in all cases. Delaying administration by 1 hr resulted in ulceration in 5 of 5 animals. The mechanism of methylprednisolone protection was not studied, but the results are consistent with the hypothesis that steroids stabilize lysosomal membranes. On the basis of results in the swine model, cholestyramine and methylprednisolone might be considered for clinical trial as pharmacological prophylaxis against stress ulceration. Their success appears to depend on administration soon after the stressful event.

5491 SERUM CALCIUM, SERUM GASTRIN, AND GASTRIC ACID SECRETION BEFORE AND AFTER PARATHYROIDECTOMY FOR HYPERPARATHYROIDISM. *(E.)* Stremple, J. F.; Watson, C. G. (Univ. of Pittsburgh, Pa.). *Surgery* 75(6):841-852, 1974.

Serum calcium, serum gastrin, and gastric acid secretion measured in 19 patients (10 women, 9 men) with primary hyperparathyroidism before and after parathyroidectomy. Fourteen patients had neither gastric nor duodenal ulcers, and 3 of these 14 had primary parathyroid hyperplasia rather than adenoma. Other conditions present with the hyperparathyroidism were: Duodenal ulcer (3); both gastric and duodenal ulcers (1); elevated basal serum gastrin (2); and markedly elevated serum gastrin level within the Zollinger-Ellison range, but no basal acid or ulcer (1). In the hyperparathyroid patients, results were as follows: (1) serum parathormone level (normal mean 4.0 ng/ml): elevated 50% above normal in patients with and without ulcers preoperatively but dropped in both to below normal after surgery; (2) serum calcium (normal mean 10 mg/100 ml): about 1/5 elevated pre- and about 1/5 reduced post-operatively in both ulcerated and non-ulcerated patients; and (3) basal serum gastrin (normal mean 36 pg/ml): elevated about 4-fold in patients without ulcer but only 2-fold in ulcer patients before surgery; after operation non-ulcerated as well as ulcerated patients showed gastrin levels about 3 times normal. In patients with duodenal ulcer but without hyperparathyroidism, the level of gastrin was about 50% above normal. The serum gastrin did not decrease postoperatively in patients with parathyroid hyperplasia. In the one hyperparathyroid patient with gastrin levels in the Zollinger-Ellison range, the mean systemic serum gastrin before parathyroidectomy was 2,035 pg/ml; the parathyroid adenoma tissue gastrin content was 16,216 pg/mg tissue; and the postoperative mean systemic serum gastrin level were 350 pg/ml. The high tissue gastrin content in the parathyroid adenoma removed from this patient, as determined by radioimmunoassay and immunofluorescence, and the decrease in serial serum gastrin measurements after its removal demonstrated that this parathyroid adenoma was also the source of gastrin: it was a parathyroid gastrinoma. In non-ulcerated patients with hyperparathyroidism, there were low basal acid levels both before and after parathyroidectomy but in those with duodenal ulcer, levels were 6 x normal pre- and 3 x normal postoperatively. The results confirm the previously reported increase in serum gastrin in patients with hyperparathyroidism without ulcer and the decrease in serum gastrin after parathyroidectomy. These findings indicate that gastrin can be added to the list of hormones secreted by a parathyroid adenoma.

5492 MECHANISM OF STRESS ULCER. IV. INFLUENCE OF FASTING ON THE TOLERANCE OF GASTRIC MUCOSAL ENERGY METABOLISM TO ISCHEMIA AND ON THE INCIDENCE OF STRESS ULCERATION. *(E.)* Menguy, R.; Masters, Y. F. (Univ. Rochester Sch. Med., N.Y.). *Gastroenterology* 66(6):1177-1186, 1974.

Hemorrhagic shock of 15 min duration in rabbits caused a severe gastric mucosal energy deficit due to shock-induced mucosal ischemia characterized by marked reduction of ATP and also the total of ATP + ADP + AMP. The deficit was more severe in the fundus and corpus than in the antrum, and was significantly more severe in all three regions in fasted as opposed to nonfasted animals. Measurement of glucose-6-phosphate levels indicated some acceleration of glycolysis in the antrum under fasted conditions. Feeding, supplemented by a carbohydrate load, rendered the gastric mucosa less vulnerable to stress ulceration. None of the nonfasted rabbits had grossly visible mucosal erosions when examined 3 hr after shock, but all but 1 of the fasted rabbits had erosive gastritis of varying severity. The hyperglycemia associated with hemorrhagic shock was absent in fasted animals, probably as a result of the rapid depletion of inadequate glucose reserves thereby reducing the amount available for anaerobic glycolysis. Such a reduced anaerobic glycolytic flux, as shown by blood lactate levels in nonfasted rabbits, would cause a further decline in the energyroducing capacity of ischemic tissues. Results uggest that the animal's state of nutrition is another odifier of the phenomenon of stress ulceration and hould be considered in any experimental study of his problem.

493 EXTENDED NEUTRALIZATION OF GASTRIC CONTENTS WITH DUCON. *(E.)* Riegel, N.; Tesler, M. .: Zimmon, D. S.; Jolly, E. R. (Biometric Testing nc., Englewood Cliffs, N.J.). *Am. J. Dig. Dis.* 9(4):335-337, 1974.

494 EFFECT OF A PENTACYCLIC TRITERPENOID, ASIATICOSIDE, ISOLATED FROM Hydrocotyle adagascariensis OR Centella asiatica, ON GASTRIC LCERS IN WISTAR RATS EXPOSED TO COLD (+2C). *(Fr.)* avokatra, A.; Nigeon-Dureuil, M.; Rakoto Ratsimaman-a, A. (Fac. Med., Paris, France). *C. R. Acad. ci. [D] (Paris)* 278(13):1743-1746, 1974.

495 SYMPTOMS OF PEPTIC ULCER. *(Fl.)* Vantrappen, G. (St. Rafael Univ. Hosp., ouvain, Belgium). *Tijdschr. Geneesk.* 29(13):610-13, 1973.

496 NONEMERGENCY RADIOLOGICAL DIAGNOSIS OF PERFORATED PEPTIC ULCERS. *(Rus.)* herbatenko, M. K.; Beresneva, E. A.; Sivash, E. S.; vdokimov, V. N. (N. V. Sklifosovskii Sci. Res. nst. Emergency Med. Treatment, Moscow, USSR). *estn. Rentgenol. Radiol.* (2):95-98, 1973.

497 THE ROLE OF PYLORIC REFLUX IN THE PATHOGENESIS OF GASTRIC ULCER. *(Fr.)* Figus, . I.; Simon, L. (Jaszbereny Hosp., Hungary). *Ann. astroenterol. Hepatol. (Paris)* 9(4):327-331, 1973.

498 FEATURES CHARACTERISTIC OF THE CURRENT COURSE OF PEPTIC ULCER. *(Rus.)* Artem'ev, . N.; Vlasova, V. E. (Moscow Inst. Med. Stomatol., SSR). *Sov. Med.* (6):3-8, 1973.

499 CONSERVATIVE SURGICAL TREATMENT OF PEPTIC ULCER AND ITS EFFECT ON PEPTIC ULCER. *(Fr.)* Alexandre, J. H. (Broussais Hosp., Paris, rance). *Ann. Gastroenterol. Hepatol. (Paris)* 9(3): 225-267, 1973.

5500 FUNCTIONAL DISORDERS AFTER GASTRECTOMY AND THEIR SURGICAL TREATMENT. *(Fr.)* Houdard, C. (Tenon Hosp., Paris, France). *Ann. Gastroenterol. Hepatol. (Paris)* 9(4):367-375, 1973.

5501 TREATMENT OF ACUTE GASTRODUODENAL BLEEDING FROM PEPTIC ULCERS. *(Rus.)* Lebedev, A. P. (Minsk Regional Hosp., USSR). *Sov. Med.* 36(4):78-81, 1973.

5502 EFFECT OF NEROBOL AND AMINOCROVIN ON SERUM AND URINARY FREE AMINO ACIDS IN PEPTIC ULCER. *(Rus.)* Komarov, F. I.; Lisovskii, V. A.; Lisovskii, I. V.; Shchedrunov, V. V. (S. M. Kirov Military Med. Acad., Leningrad, USSR). *Sov. Med.* 36(5):83-87, 1973.

5503 EFFECTS OF CARBENOXOLONE ON GASTRIC MUCUS. *(E.)* Lindup, W. E.; Shillingford, J. S.; Smith, M. J.; Parke, D. V. (Dept. Biochem., Univ. Surrey, Guildford, England). *Gastroenterology* 66(4):731, 1974.

5504 EMERGENCY SURGERY IN PEPTIC ULCER. *(Ger.)* Kaufer, C. (Surg. Clin., Univ. Bonn. Germany). *Therapiewoche* 24(4):315-316, 1974.

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5507 CONSERVATIVE THERAPY FOR COMPLICATED ULCER. *(Ger.)* Becker, K. (1st Med. Clin., Univ. Hamburg, Germany). *Therapiewoche* 24(4):272-277, 1974.

5508 CONSERVATIVE THERAPY FOR UNCOMPLICATED ULCER. *(Ger.)* Muller-Wieland, K. (1st Med. Clin., Univ. Hamburg, Germany). *Therapiewoche* 24(4):266-272, 1974.

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5510 THE ASSOCIATION OF PERFORATION WITH OTHER COMPLICATIONS OF PEPTIC ULCER. *(Rus.)* Neimark, I. I. (Clin. Hosp. No. 2., Barnaul, USSR). *Vestn. Khir.* 111(11):26-30, 1973.

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5512 ACUTE HEMORRHAGIC GASTRITIS: *(Sp.)* Duran, M. O. (T. Alverez Hosp., Buenos Aires, Argentina). *Acta Gastroenterol. Latinoam.* 5(4):181-188, 1973.

5513 CYSTIC AND INFILTRATIVE HYPERPLASIA OF THE GASTRIC MUCOSA ASSOCIATED WITH GASTRO-

ENTEROSTOMY. *(Por.)* de Franco, M. F.; Quevedo, F. C.; Vannucchi, H. (Fac. Med. Biol. Sci., Botucatu, Brazil). *Arq. Gastroenterol.* 11(2):73-76, 1974.

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5515 EFFECT OF METIAMIDE, A HISTAMINE H_2-RECEPTOR ANTAGONIST, ON GASTRIC RESPONSE TO HISTAMINE, PENTAGASTRIN, INSULIN, AND PEPTONE MEAL IN MAN. *(E.)* Konturek, S. J.; Biernat, J.; Oleksy, J. (Med. Acad., Krakow, Poland). *Am. J. Dig. Dis.* 19(7):609-616, 1974.

5516 MEDICAL VAGOTOMY: NEW EVIDENCE OF ITS POTENTIAL USEFULNESS AS A PREOPERATIVE TEST. *(E.)* Meeroff, J. C.; Ferreira, J. A.; Meeroff, M. (Munic. Hosp., Buenos Aires, Argintina). *Am. J. Dig. Dis.* 19(7):617-622, 1974.

5517 DEATH AFTER PARTIAL GASTRECTOMY FOR PEPTIC ULCER - A LONG TERM STUDY. Din, N. A.; Small, W. P. (Western Gen. Hosp., Edinburgh, Scotland). *Gut* 15(4):335, 1974.

5518 HOSPITAL ADMISSION FOR PEPTIC ULCER AND ACUTE GASTROINTESTINAL BLEEDING IN THE UNITED KINGDOM 1958-1970. *(E.)* Brown, R. C.; Langman, M. J. S. (Dept. Med., Univ. Nottingham, England). *Gut* 15(4):335, 1974.

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5521 POLDIN METHYLSULFATE IN THE TREATMENT OF GASTRIC AND DUODENAL ULCERS. *(Ger.)* Balta, N.; Cruceanu, I.; Metz, L. (Inst. Drug Control, Bucharest, Rumania). *Therapiewoche* 24(4):324, 1974.

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5523 INHIBITION OF NOCTURNAL ACID SECRETION IN DUODENAL ULCER BY ORAL METIAMIDE. *(E.)* Williams, J. G.; Milton-Thompson, G. J.; Jenkins, D. J. A.; Misiewicz, J. J. (Royal Naval Hosp., Plymouth, England). *Gut* 15(4):337, 1974.

5524 THE PREDICTIVE ACCURACY OF THE INSULIN TEST AFTER VAGOTOMY: A NEW INTERPRETATION. *(E.)* Faber, R. G.; Russell, R. C. G.; Parkin, J. V.; Whitfield, P.; Hobsley, M. (Middlesex Hosp., London, England). *Gut* 15(4):347-348, 1974.

5525 CHARACTERIZATION OF GLUCAGON RESPONSES TO DIFFERENT MEALS IN THE DUMPING SYNDROME. *(E.)* O'Connor, F. A.; Buchanan, K. D.; Trimble, E. R.; Hayes, J. J.; Kennedy, T. L. (Dept. Med., Queen's Univ. Belfast, Northern Ireland). *Gut* 15(4):348, 1974.

5526 THE EFFECT OF HISTAMINE (H_2-) RECEPTOR BLOCKADE ON VAGALLY-INDUCED GASTRIC SECRETION IN MAN. *(E.)* Carter, D. C.; Werner, M.; Forrest, J. H.; Heading, R. C.; Park, J.; Shearman, D. J. C. (Royal Infirm., Edinburgh, Scotland). *Scot. Med. J.* 19(3):153, 1974.

5527 TENDENCY FOR PATIENTS WITH PEPTIC ULCER TO RECEIVE EXCESS MEDICAL IONIZING RADIATION. *(E.)* Kitabatake, T.; Yokoyama, M. (Niigata Univ. Sch. Med., Japan). *Tohoku J. Exp. Med.* 112(3):205-208, 1974.

See also, 4974, 4991, 5078, 5084, 5095, 5106, 5374, 5388, 5391, 5396, 5399, 5415, 5451, 5457, 5462, 5468, 5478, 5626.

SMALL INTESTINE

5528 THE ROLES OF INTRALUMINAL CHYME AND VASOMOTOR RESPONSE IN THE PATHOGENESIS OF NON-OCCLUSIVE INTESTINAL INFARCTS. *(E.)* Kwan, A.; Chiu, C. J.; Mersereau, W.; Hinchey, E. J. (McGill Gen. Hosp., Montreal, Canada). *Ann. Surg.* 179(6):877-882, 1974.

The role of intraluminal chyme and the splanchnic vasomotor reaction in the pathogenesis of non-occlusive intestinal infarcts was studied in 5 mongrel dogs, in which 3 types of intestinal loops were created: (1) cervical loop, a heterotopic autotransplant of a segment of intestine, with no chyme, and disconnected from splanchnic innervation: (2) Thiry-Vella loop, simultaneously constructed in the abdomen also devoid of intraluminal chyme, but still innervated; and (3) intestine-in-continuity, with both splanchnic innervation and intraluminal chyme. Hemorrhagic shock was then induced and the morphological response of these types of ntestine examined. Mucosal hemorrhages were ob-erved in both the Thiry-Vella loops and the in-estine-in-continuity, and microscopy of repre-entative sections of each loop of intestine also howed severe damage to the intestinal mucosa. he microvasculature of the mucosa revealed the bsence or minimal presence of previously i.v. dministered colloidal carbon particles in the vas-ular endothelium of the cervical loops, but both ypes of intestinal loops retained carbon parti-les on the vascular wall, suggesting damage to the ndothelium. These results indicate that in non-cclusive hemorrhagic infarction of the intestinal ucosa, the peculiar splanchnic vasomotor response lays a dominant role. Various therapeutic modali-ies may be useful in the treatment and prevention f the non-occlusive intestinal infarcts, including reatment of the low flow state itself, with volume xpansion and the administration of cardiac ino-ropic agents. Adrenergic blocking agents may be sed to alleviate splanchnic vasoconstriction and he instillation of enzyme inhibitors and antibi-tics may decrease the effects of intraluminal di-estive enzymes and toxins.

529 DUODENITIS. *(E.)* Gregg, J. A.; Garabedian, M. (Lahey Clin. Fdn., Boston, lass). *Am. J. Gastroenterol.* 61(3):177-184, 1974.

ndoscopic evidence of duodenitis was encountered n 44 of 145 consecutive patients examined mostly or esophageal or gastric problems; 20% were referred or indeterminate upper abdominal pain. Visually, uodenitis was associated with patchy areas of ery-hema and edema and, in a few instances, mucosal emorrhage. In 31 patients, these findings were een without duodenal ulceration while in 13 pa-ients duodenitis was associated with duodenal ulcer lthough the duodenitis was remote from the area of lceration in 8 of these patients. In most cases uodenitis occurred as a solitary finding or in asso-iation with gastritis (2 patients), gastric ulcer r gastric erosions or both (4 patients), or eso-hagitis (2 patients). Histologically the lesion onsisted of variable degrees of infiltration with ound cells. The presence or absence of inflamma-ory disease in the bulb, as determined histologic-lly, correlated well with the endoscopic findings. ther than deformity of the bulb, no radiological indings suggested the presence of duodenitis. uodenitis had healed completely in 3 of 5 patients ho were examined endoscopically after an appropri-te period on an ulcer diet, milk, and antacids. t was not possible to determine whether duodenitis *er se* produced any symptoms in this series.

530 AN ANIMAL MODEL FOR THE STUDY OF SMALL-BOWEL TUMORS. *(E.)* Coop, K. L.; harp, J. G.; Osborne, J. W.; Zimmerman, G. R. (Coll. ed., Univ. Iowa, Iowa City). *Cancer Res.* 4(6):1487-1494, 1974.

o facilitate study of tumors of the human gastro-ntestinal tract, a possible animal model for this urpose was investigated. Since chemical carcino-ens often involve many problems, tumors here were induced in male Holtzman rats by X-irradiation of only the hypoxic, temporarily exteriorized ileum and jejunum. Following an exposure to 200 r, 56% of the rats developed adenocarcinoma somewhere in the irradiated segment. The majority of rats with intestinal tumors could be identified in the terminal phase of illness by their hunched posture and inability to perform normal body movements. Macroscopic intestinal tumors were observed at autopsy in 58 of the 103 rats. Pathological features observed in the remaining 45 rats included pneumonia, intestinal vasculitis, and features characteristic of the gastrointestinal radiation syndrome. Macroscopic metastases were not observed outside the small intestine; however, metastases or direct extensions were seen microscopically in the mesentery, pancreas, and abdominal wall. A hypochromic microcytic anemia was associated with the tumors and appeared to be the result of blood loss from the tumors into the intestinal lumen. Other pathological features associated with these tumors were weight loss, diarrhea, obstruction of the small bowel, and intestinal perforation and hemorrhage. These features are similar to those described in the literature for malignant tumors of the small intestine in humans. This animal model, therefore, would appear to be potentially useful for studies relating to humans with small-bowel neoplasms.

5531 INTRAMURAL DUODENAL HEMATOMA. *(E.)* Fullen, W. D.; Selle, J. G.; Whitely, D. H.; Martin, L. W.; Altemeier, W. A. (Univ. Cincinnati Med. Ctr., Ohio). *Ann. Surg.* 179(5):549-556, 1974.

Fourteen patients (8 males and 6 females, aged 4-68 yr) treated for intramural duodenal hematoma were studied. Contrast radiographic evidence was the basis for diagnosis in 13 cases, and 1 case was discovered at laparotomy. The treatment in 11 cases was nonoperative, consisting of restriction of oral intake, nasogastric suction when indicated, and i.v. infusion of fluids and electrolytes; all 11 patients survived without complication. The other 3 patients were operated on, 1 for an incorrect diagnosis of acute appendicitis and 2 with a correct preoperative diagnosis of intramural duodenal hematoma. All of these patients survived, although 1 pediatric patient required reoperation one day postoperatively. The symptom complex in this series of patients was generally one of mild to moderate abdominal pain beginning after blunt trauma to the abdomen. Thus, diagnostic consideration of intramural duodenal hematoma should not depend on the totally symptom-free interval previously described as typical of the lesion. The physical findings consisted of abdominal tenderness in the epigastrium or upper quadrant with frequent voluntary guarding. Blood loss was not great and hyperamylasemia was encountered in only a small number of patients. Conservative therapy is recommended for patients with a secure diagnosis of intramural duodenal hematoma in whom no additional injuries requiring laparotomy are identifiable.

5532 PRIMARY ADENOCARCINOMA OF THE DUODENUM. *(E.)* Moss, W. M.; McCart, M.; Juler, G.;

Miller, D. R. (Affiliated Hosp., Univ. California, Irvine). *Arch. Surg.* 108(6):805-807, 1974.

5533 PSEUDO-OBSTRUCTION - A GENERALIZED DISORDER OF GASTROINTESTINAL MOTOR DYSFUNCTION. *(E.)* Schuffler, M. D.; Finley, J. G.; Pope, II, C. E. (Univ. Washington Sch. Med., Seattle). *Gastroenterology* 66 (4):773, 1974.

5534 MYASTHENIA GRAVIS ASSOCIATED WITH LEIOMYOSARCOMA OF THE DUODENUM. *(E.)* Citron, B. P.; Meyers, H. I.; McCormick, R. (Univ. Southern California Med. Ctr., Los Angeles). *Gastroenterology* 66(4):676, 1974.

5535 ONE NEW CASE OF POSTTRAUMATIC CICATRICAL STENOSIS OF THE SMALL INTESTINE. *(Fr.)* Unfried, P.; Camelot, G.; Kahn, J.; Etievent, J.; Gillet, M. (Univ. Hosp. Ctr., Besancon, France). *Lyon Chir.* 70(2):119-121, 1974.

5536 SIMPLE STENOSING CHRONIC ULCER OF THE SMALL INTESTINE. *(Fr.)* Loup, J. (Hosp. Ctr., Auch, France). *Lyon Chir.* 70(2):122-123, 1974.

5537 HEMANGIOPERICYTOMA: A CASE LOCATED IN THE SMALL INTESTINE. *(Pol.)* Bobrzynski, A.; Matusik, J. (Acad. Med., Krakow, Poland). *Pol. Przegl. Chir.* 45(12):1457-1460, 1973.

5538 ATRESIA AND CONGENITAL STENOSIS OF THE SMALL INTESTINE. *(It.)* Bevilacqua, G. (Inst. Anat., Univ. Pisa, Italy). *Arch. de Vecchi Anat. Patol.* 57(3):413-432, 1972.

5539 PATHOLOGY OF MECKEL'S DIVERTICULUM. *(Sp.)* Martinez Diez, M.; Echenique Elizondo, M.; Garcia Julian, G. (Fac. Med., Univ. Zaragoza, Spain). *Rev. Esp. Enferm. Apar. Dig.* 43(1):45-60, 1974.

5540 EFFECT OF INTESTINAL BYPASS METHODS IN CASES OF MASSIVE OBESITY. *(Fr.)* Shibata, H. R. (Roy. Victoria Hosp., Montreal, Canada). *Ann. Gastroenterol. Hepatol. (Paris)* 9(5):457-465, 1973.

5541 ANOMALOUS LOCATION OF THE PAPILLA OF VATER. *(E.)* Pereira-Lima, J.; Pereira-Lima, L. M.; Nestrowski, M.; Cuervo, C. (Catholic Med. Sch. Porto Alegre, Brazil). *Am. J. Surg.* 128(1):71-74, 1974.

5542 ANTICIPATING PRESSURE NECROSIS IN INTESTINAL OBSTRUCTION. *(E.)* Votik, A. J. (Dept. Surg., Univ. Manitoba, Winnipeg, Canada). *Am. J. Surg.* 128(1):122-123, 1974.

5543 A STUDY OF THE ELECTRICAL POTENTIAL DIFFERENCE (PD) ACROSS HUMAN ILEOSTOMY MUCOSA. *(E.)* Isaacs, P.; Turnberg, L. A. (Manchester Royal Infirm., England). *Gut* 15(4):339, 1974.

5544 OSMOTIC, ELECTROLYTE, AND pH CHANGES IN THE HUMAN JEJUNUM AFTER TRUNCAL VAGOTOMY AND DRAINAGE. *(E.)* Temple, J. G.; Birch, A.; Shields, R. (Dept. Surg., Liverpool, England). *Gut* 15(4):347, 1974.

5545 JEJUNO-ILEOSTOMY AND ABDOMINAL LIPECTOMY IN THE TREATMENT OF MORBID OBESITY. *(E.)* Drew, E. J. (no affil.). *J. Iowa Med. Soc.* 64(6):238-241, 1974.

5546 VITELLINE ARTERY AND VEIN REMNANTS AS A CAUSE OF INTESTINAL OBSTRUCTION. *(E.)* Kleinhaus, S.; Cohen, M. I.; Boley, S. J. (Montefiore Hosp., Bronx, N.Y.). *J. Pediatr. Surg.* 9(3):295-300, 1974.

5547 JEJUNOILEAL BYPASS FOR MORBID OBESITY IN ADOLESCENTS. *(E.)* Randolph, J. G.; Weintraub, W. H.; Rigg, A. (Children's Hosp. Natl. Med. Ctr., Washington, D.C.). *J. Pediatr. Surg.* 9(3):341-348, 1974.

5548 AN IMPROVED TECHNIQUE FOR THE CORRECTION OF CONGENITAL DUODENAL OBSTRUCTION IN THE NEONATE. *(E.)* Weitzman, J. J.; Brennan, L. P. (Children's Hosp., Los Angeles, Calif.). *J. Pediatr. Surg.* 9(3):385-388, 1974.

5549 CONGENITAL SEGMENTAL DILATATION OF THE JEJUNUM. *(E.)* Komi, N.; Kohyama, Y. (no affil.). *J. Pediatr. Surg.* 9(3):409-410, 1974.

5550 TRENDS FOR REDUCING THE MORTALITY FROM ACUTE INTESTINAL OBSTRUCTION. *(Rus.)* Napalkov, P. N.; Miroshnikov, B. I. (Leningrad Med. Inst. Sanitation Hyg., USSR). *Vestn. Khir.* 111(11): 8-13, 1973.

See also, 5051, 5387, 5417, 5476, 5499, 5562, 5582,
5600, 5604, 5608, 5727, 5729, 5759.

SMALL INTESTINE

Malabsorption

5551 STUDIES ON THE NATURE AND SIGNIFICANCE OF CONNECTIVE TISSUE ANTIBODIES IN ADULT COELIAC DISEASE AND CROHN'S DISEASE. *(E.)* Magalhaes, A. F. N.; Peters, T. J.; Doe, W. F. (Roy. Postgrad.

led. Sch., London, England). *Gut* 15(4):284-288, 974.

his study was designed to determine the significance f the presence of connective tissue antibodies in dult celiac disease, their immunoglobulin class, nd their relationship to gluten withdrawal from the iet. Ninety-two patients with this disease (70 emales and 22 males, 12-65 yr old) were investigated; 4 received a normal diet while 73 were on a gluten- ree diet for at least 3 months. Similarly tested ere 20 patients with Crohn's disease and 89 control atients. Serum positive for the connective tissue ntibodies was found in 36 (39%) of the 92 patients ith adult celiac disease, and these were classified s IgA (13), IgG (16), and both (7). The antibodies ere also found in 5 out of the 20 Crohn's disease era; all were IgG class. Positive sera (both IgG) ere found in only 2 of 89 controls: one had chronic iver disease and the other, chronic lymphatic eukemia. Of 44 patients on a normal diet, 25 58%) had positive sera (IgA 11; IgG 7; and both) while the 73 gluten-free diet patients showed positive sera in 17 (23%) of the cases (IgA 3; gG 13; and both 1), a striking reduction in IgA. ejunal fluid collected from 15 celiac patients to nvestigate the site of antibody secretion showed no ntibody activity, including 7 patients whose sera ere positive. Connective tissue antibody activity as not absorbed by fractions of gluten. In addition, reparations of human reticulin and glomerular base- ent membrane as well as elastin and collagen failed o absorb connective tissue antibody. While the na- ure of the antigens against which these antibodies re directed remains obscure, it seems likely that hey result from a combination of tissue damage and efective antigen handling and are unlikely to be of athogenetic significance.

552 TRANSIENT KWASHIORKOR: A CAUSE OF FATTY LIVER FOLLOWING SMALL BOWEL BYPASS. *(E.)*

hite, J. J.; Moxley, R. T.; Pozefsky, T.; Lockwood, . H. (Johns Hopkins Univ. Sch. Med., Baltimore, d.). *Surgery* 75(6):829-840, 1974.

hanges in protein nutrition were compared with al- erations in hepatic morphology and function in 18 atients (22 to 41 yr) undergoing small bowel bypass or morbid obesity. Weight loss was considered atisfactory but was accompanied by intestinal malabsorption. Fecal fat excretion averaged 2.7 g/day reoperatively but increased significantly after urgery. Decreases in serum cholesterol from 189 g% to 130-140 mg%, and in D-xylose excretion from .18 g/5 hr to 2.4 g/5 hr were noted. Moderate o marked hepatic fat accumulation occurred during he periods of intense weight loss with return to reoperative levels after weight stability was ttained. Amino acid profiles showed significant epressions in 6 of the 7 essential amino acids with nly methionine unchanged. Among the 12 nonessential amino acids assayed, significant reductions occurred in 6; proline, taurine, and histidine were unchanged; and serine and glycine levels were significantly elevated. Reduced absorption of lysine, leucine, and glycine were observed in patients who had achieved weight stability and reduction in fatty metamorphosis of the liver toward normal levels. These studies demonstrate that a state of protein malnutrition develops during the period of intense weight loss following jejunoileal bypass and that protein nutrition returns toward normal levels coincident with attainment of weight stability. Significant fatty infiltration of the liver also develops during intense weight loss. The morphologic similarity between these changes and those noted in the livers of patients with kwashiorkor and in those of laboratory animals made protein-deficient suggests that their etiology may be similar.

5553 INTESTINAL DIPEPTIDASES IN PRIMARY PROTEIN MALNUTRITION. *(E.)*

Hazuria, R. S.; Sarin, G. S.; Srivastava, P. N.; Misra, R. C.; Bhatt, I. N.; Chuttani, H. K. (Maulana Azad Med. Coll., New Delhi, India). *Am. J. Clin. Nutr.* 27(7):760-763, 1974.

Intestinal dipeptidase activities were studied in 20 normal control subjects and in 9 patients with primary protein malnutrition. This study in India revealed that the controls had low levels as compared with American and European figures. Although the glycyl-L-leucine and glycyl-L-valine dipeptidase activity levels of the patients were significantly lower (58.8 and 43.9 U/mg N/min, resp.) than those of the control subjects (124.9 and 88.9 U/mg N/min, resp.), no gross damage to their intestinal mucosa was observed. Possibly, early, minor morphological changes in the brush border were missed by the light microscope but were severe enough to affect the enzyme levels. It is postulated that the effects of protein deficiency are increased because the enzymes, present in insufficient amounts due initially to protein malnutrition, are unable to act on the low levels of protein available in the gastrointestinal tract, thus creating and propagating a vicious cycle.

5554 BILE SALT METABOLISM IN TROPICAL SPRUE. *(E.)*

Bevan, G.; Engert, R.; Klipstein, F. A.; Maldonado, N.; Rubulis, A.; Turner, M. D. (Univ. Rochester Sch. Med., Dent., N.Y.). *Gut* 15(4):254-259, 1974.

To assess the importance of bile salts in the pathogenesis of steatorrhea in tropical sprue, mean and peak jejunal bile salt concentrations measured during digestion of a standard fat meal in 6 Puerto Rican patients with the untreated disease, all of whom had steatorrhea, was found to be significantly lower (mean 2.4 mM/liter; peak 5.4 mM/liter) than in 6 asymptomatic subjects (mean 11.9 mM/liter; peak 21.4 mM/liter) from the same population who had normal fat absorption and no steatorrhea. Bile salt pool size and turnover time did not significantly differ in the 2 groups. Other laboratory investigations included bone marrow and jejunal morphology examinations, as well as measurements of hemoglobin, serum folate, serum vitamin B_{12}, ^{57}Co-vitamin B_{12} absorption, xylose absorption (urine excretion and serum peak), and fecal fat. It is suggested that bile salt concentrations may be reduced in the proximal small intestine of patients with tropical sprue as a result of excessive dilution of intestinal fluid since patients with this disease have been found to be in an active secretory state for water and electrolytes. The finding of low bile salt concentrations in 2 asymptomatic subjects indicates that bile salt lack alone may not be sufficient to produce steatorrhea.

5555 INTESTINAL EXFOLIATED CELLS IN INFANTS: A SYSTEM FOR STUDY OF MICROVILLOUS PARTICLES. *(E.)* Torres-Pinedo, R.; Rivera, C.; Garcia-Castineiras, S. (Univ. Puerto Rico Sch. Med., San Juan). *Gastroenterology* 66(6):1154-1160, 1974.

Products of jejunal mucosal exfoliation in 8 infants (3-5 months old) were collected from the intestinal lumen by intestinal perfusion. The brush border materials collected in the perfusion solutions were separated into 3 fractions by differential centrifugation. The first fraction contained large brush border fragments and intact brush borders, including those still attached to degenerating cells. The second fraction was composed mainly of split microvilli, while the third fraction contained amorphous residues of the microvilli. Since exfoliated jejunal enterocytes are rapidly digested and autolyzed in the intestinal lumen, the collection of desquamated cells was attempted here by intestinal perfusion of infants who had recovered from postenteritic lactose intolerance but who were healthy and growing normally on a lactose-free diet. The specific activities of sucrase in the perfusion solution and in the microvilli (second) fractions were comparatively not much lower than those reported in mucosal biopsies of infants and children and in highly purified microvillous membranes from human intestine. These findings indicate that sucrase is retained to a certain extent on the microvillous surface during cell desquamation and breakage. The relative proportions of microvillous and nonmicrovillous protein in the 3 fractions were assessed by using sucrase as a tracer of the microvillous membrane. The enzyme was more or less evenly distributed among the 3 fractions, but its specific activity was 5 times higher in the microvillous fraction (0.52 μM/min/mg of protein).

5556 HUMAN SERUM RETINOL TRANSPORT IN MALABSORPTION. *(E.)* Smith, F. R.; Lindenbaum, J. (Columbia Univ. Coll. Phys. Surg., N.Y.). *Am. J. Clin. Nutr.* 27(7):700-705, 1974.

5557 PREVALENCE AND PERSISTENCE OF LACTOSE MALABSORPTION AMONG YOUNG JAMAICAN CHILDREN. *(E.)* Stoopler, M.; Frayer, W.; Alderman, M. H. (Cornell Univ. Med. Sch., N.Y.). *Am. J. Clin. Nutr.* 27(7):728-732, 1974.

5558 LACTASE DEFICIENCY IN A RURAL AREA OF MEXICO. *(E.)* Lisker, R.; Lopez-Habib, G.; Daltabuit, M.; Rostenberg, I.; Arroyo, P. (Natl. Inst. Nutr., San Fernando y Viaducto Tlalpan, Mexico City). *Am. J. Clin. Nutr.* 27(7):756-759, 1974.

5559 COLLAGENOUS BASEMENT MEMBRANE THICKENING IN JEJUNAL BIOPSIES FROM PATIENTS WITH ADULT COELIAC DISEASE. *(E.)* Bossart, R.; Henry, K.; Doe, W. F.; Booth, C. C. (Royal Postgrad. Med. Sch., London, England). *Gut* 15(4):337, 1974.

5560 THE CELLULAR INFILTRATE OF THE JEJUNUM IN COELIAC PATIENTS WITH COMPLICATING LYMPHOMA. *(E.)* Ferguson, R.; Asquith, P.; Cooke, W. T. (Gen. Hosp., Birmingham, England). *Gut* 15(4):338-339, 1974.

5561 COELIAC DISEASE, MALIGNANCY, AND GLUTEN-FREE DIET. *(E.)* Holmes, G. K. T.; Stokes, P. L.; McWalter, R.; Waterhouse, J. A. H.; Cooke, W. T. (Gen. Hosp., Birmingham, England). *Gut* 15(4):339, 1974.

5562 IMMUNOLOGICAL PHENOMENA FOLLOWING GLUTEN CHALLENGE IN THE JEJUNUM OF PATIENTS WITH ADULT COELIAC DISEASE AND DERMATITIS HERPETIFORMIS. *(E.)* Lancaster-Smith, M.; Kumar, P.; Clark, M. L. (St. Bartholomew's Hosp., London, England). *Gut* 15(4):339, 1974.

5563 A MALABSORPTION SYNDROME IN OVERLAND TRAVELLERS TO INDIA: MUCOSAL COLONIZATION BY BACTERIA. *(E.)* Tomkins, A. M.; James, W. P. T.; Drasar, B. S. (London Sch. Hyg. Trop. Med., England). *Gut* 15(4):340, 1974.

5564 LACTOSE MALABSORPTION IN FINNISH-SPEAKING AND SWEDISH-SPEAKING POPULATIONS IN FINLAND. *(E.)* Sahi, T. (Dept. Public Health Sci., Univ. Helsinki, Finland). *Scand. J. Gastroenterol.* 9(3):303-308, 1974.

See also, 5328, 5382, 5561, 5706, 5746, 5761.

LARGE INTESTINE

5565 MUCUS-SECRETING COLONIC CARCINOID TUMORS: LIGHT- AND ELECTRON-MICROSCOPIC STUDY OF THREE CASES. *(E.)* Hernandez, F. J.; Fernandez, B. B. (Lutheran Gen. Hosp., Park Ridge, Ill.). *Dis. Colon Rectum* 17(3):387-396, 1974.

Case histories of 3 patients (2 women and 1 man, 60-80 yr old) with carcinoid tumors that showed mucus secretion and had the typical histologic features of carcinoid tumors are presented. One patient died 2 yr after surgery. Two of the tumors (rectal carcinoids) were argentaffin-positive; the other, an appendiceal tumor, was argentaffin-negative but argentaffin granules were demonstrated in the cytoplasm of the tumor cells at the ultrastructural level. Examination with electron microscopy revealed PAS-positive droplets in 2 specimens which corresponded at the ultrastructural level to numerous apical and perinuclear vacuoles that compressed the enterochromaffin granules toward the periphery of the cytoplasm. In some of the cells the vacuoles and argentaffin granules were intimately related to the Golgi apparatus. The argentaffin granules were found mostly in subnuclear locations and, except for the coexistence with secretion vacuoles in the cytoplasm of the tumor cells, no definite morphologic relationship between these 2 cell products could be established. Nests of tumor cells with numerous argentaffin granules and no evidence of intracytoplasmic vacuoles were encountered in some areas. The specimen from the third patient contained nests of carcinoid cells with a smaller number of argentaffin granules in the cytoplasm and with clusters of small vacuoles in one pole of the cells, usually opposite the aggregates of enterochromaffin granules. Scattered intracytoplasmic mucin droplets shown by light microscopy to be associated with the argentaffin granules corresponded at the ultrastructural level to large vacuoles limited by a single membrane. Mucus secretion in carcinoid tumors does not bear any relation to the extent of malignancy; and, mucus-secreting adenocarcinomas evolving from carcinoid tumors behave like other colonic adenocarcinomas.

5566 IMMUNOLOGICAL DETECTION OF ANTIGEN(S) ASSOCIATED WITH RAT COLON CARCINOMA. *(E.)* Garmaise, A. B. K.; Rogers, A. E.; Newberne, P. M.; Saravis, C. A.; Kupchik, H. Z.; Zamcheck, N. (Massachusetts Inst. Technol., Cambridge). *Nature* 248(5450):706-707, 1974.

The rat with adenocarcinoma of the colon, induced by 1,2-dimethylhydrazine, is presented as a useful animal model for the study of human colon carcinoma. Twenty-eight male Sprague-Dawley rats (4 weeks old) were fed a semisynthetic diet for 3 months, given 10 weekly intragastric doses of 1,2-dimethylhydrazine (30 mg/kg), and killed 6 to 8 months later when tumors causing bleeding intussusception or obstruction developed in the intestine. At autopsy, colon tumors 3 cm or greater in diameter as well as sections of normal colon were frozen in liquid nitrogen. Pooled tumors (4.2 g) were minced and homogenized, centrifuged, and dialysed. Antibodies to the tumor macromolecules were produced in New Zealand adult rabbits and they were bled 7 days after the last injection, injected again, and then bled repeatedly for several weeks. Heterologous antibodies were removed from the antisera by absorbing with extracts of normal rat colon and affinity chromatography beads. Absorbed antisera to rat colon tumors (10 μliters) were reacted by the Ouchterlony technique. Counterimmunoelectrophoresis was performed in which macromolecules from the colon tumors and normal colon were electrophoretically transported to the absorbed tumor antibodies. When seven 2-fold serial dilutions of colon tumor extract and of normal colon extract were reacted with a constant concentration of antibody to rat colon tumors, reactions were obtained with the tumor extract at all dilutions, but no reactions were obtained with dilutions of the normal colon extracts. Preliminary work indicates that the absorbed antisera reacted with extracts made from 40 fetal Sprague-Dawley rats (14th day of gestation). Counterimmunoelectrophoresis indicated a strong reaction between fetal extract components and the tumor antibodies. Results showed that the tumor antibodies did not cross-react with human carcinoembryonic antigen, and rat tumor antigen did not react with anti-carcinoembryonic antigen antisera.

5567 TREATMENT OF SCHISTOSOMAL POLYPOSIS OF THE COLON WITH NIRIDAZOLE (AMBILHAR). *(E.)* Farid, Z.; El Masry, N. A.; Young, S. W.; Bassily, S.; Sparks, H. A.; Hassan, A. (Abbassia Fever Hosp., Cairo, Egypt). *J. Trop. Med. Hyg.* 77(3):65-67, 1974.

For schistosomal polyposis of the colon, found in 20% of Egyptian farmers with schistosomiasis and previously treated by surgery only, immediate and long-term results of another therapeutic approach with niridazole is reported. Seventeen male farmers (16 to 45 years old) with multiple schistosomal polyposis of the colon, acute bloody diarrhea, severe anemia, and hypoalbuminemia were treated with niridazole (25 mg/kg/day) p.o. for 10 days. The immediate results of treatment were excellent. Symptomatic improvement was rapid, and bloody diarrhea ceased in all patients within 1 to 2 weeks of completing treatment. The anemia and hypoalbuminemia were corrected with oral iron and a high protein diet. Three to six months after treatment, all patients had ceased to pass live *Schistosoma mansoni* eggs in their stools. Sigmoidoscopic and air contrast barium enema examinations showed marked improvement in all 17 patients. In 12, there was complete resolution of all the polyps, and in the remaining 5 patients, only a few polyps remained in the rectosigmoid colon. However, 2-3 years after treatment, only 2 patients remained uninfected, and 10 of the reinfected subjects had recurrence of active polyposis of the rectosigmoid colon with bloody diarrhea. It is suggested that all patients should be checked at 12 month intervals and treated again with niridazole if they are reinfected.

5568 INTESTINAL STREAMING PATTERNS IN CHOLERRHOEIC ENTEROPATHY AND DIVERTICULAR DISEASE. *(E.)* Findlay, J. M.; Mitchell, W. D.; Eastwood, M. A.; Anderson, A. J. B.; Smith, A. N. (Western Gen. Hosp., Edinburgh, Scotland). *Gut* 15(3):207-212, 1974.

Gastrointestinal streaming, demonstrated by differences in recovery rates of synchronously fed markers for the solid and liquid phases, was investigated in 17 patients (5 with cholerrheic enteropathy, 7 with colonic diverticulosis, and 5 with normal bowel habits) and 7 healthy volunteers. Polyethylene glycol was the liquid phase marker administered p.o. (500 mg 3 times/day), and the solid phase marker, chromium sesquioxide (Cr_2O_3), was also given p.o. (500 mg 3 times/day) synchronously with the polyethylene glycol for 1 day. The 24 hr pooled stool samples were analyzed for output of the 2 markers per 24 hr. In controls and in patients with normal bowel habits, throughput rates of polyethylene glycol and Cr_2O_3 showed no significant differences. However in subjects with cholerrheic enteropathy, the polyethylene glycol rate was 1.5 times faster than the Cr_2O_3 rate, while in the group with diverticulosis the rate was 0.75 times slower than Cr_2O_3, a significant decrease. These streaming patterns confirm current views on intestinal dysfunction in cholerrheic enteropathy and colonic diverticulosis which may reflect the effects of colonic hypersegmentation on the relative distribution of the liquid and solid phases.

5569 FAMILIAL INCIDENCE OF JUVENILE POLYPOSIS COLI. *(E.)* Gathright, J. B., Jr.; Coffer, Jr., T. W. (Ochsner Fdn. Hosp., New Orleans, LA.). *Surg. Gynecol. Obstet.* 138(2):185-188, 1974.

The familial nature of juvenile polyposis coli is discussed and certain pathologic and clinical features are presented. The onset of symptoms has been given as 3 to 6 years but is quite variable. The presenting symptom is almost always rectal bleeding. Seven of 10 members of one family had roentgenographic and histologic evidence of the disease. All 7 submitted to proctoscopic examination and, of these, 4 had polyps removed which, on histologic examination, proved to be typical juvenile polyps. Six of the patients were examined by means of barium enema, and in all of these, examinations revealed polyps above the level of sigmoidoscopic examination. At sigmoidoscopy, the polyps have a characteristic red color, contrasting sharply with the surrounding mucosa. Diagnosis can only be made histologically. Treatment includes the removal of polyps within the reach of the sigmoidoscope. Polyps prolapsing through the anus are those most often associated with bleeding. Operative intervention is rarely indicated, however; symptomatic treatment is preferable. The disease apparently has no malignant potential.

5570 DIAGNOSTIC FEATURES OF CLINDAMYCIN-ASSOCIATED PSEUDOMEMBRANOUS COLITIS. *(E.)* Tedesco, F. J.; Stanley, R. J.; Alpers, D. H. (Washington Univ. Sch. Med., St. Louis, Mo.). *N. Engl. J. Med.* 290(15):841-843, 1974.

Severe diarrhea, abdominal pain, distention, and nausea developed in 3 patients 7-10 days after institution of clindamycin (300 mg p.o. every 6-8 hr) for pneumonia, amyotrophic lateral sclerosis, and chronic renal failure. *Escherichia coli* was isolated from the stools of all 3 patients, and *Streptococcus faecalis* was present in 1 patient. When overlying mucus and cell debris was removed, proctoscopic examination revealed small (1-5 mm), raised, yellowish-white plaques on the surface of the mucosa. The mucosa was erythematous and friable. None of the smears taken from these plaque-like lesions contained staphylococcus or any enteric pathogen. Barium contrast studies of the colon showed that the entire colon was covered with many flat, plaque-like lesions ranging in size from 2-8 mm. These lesions were demonstrated very well on air contrast films. No ulcerations, "thumb printing", or larger polypoid lesions were observed. Histological examination of biopsies confirmed the diagnosis of pseudomembranous colitis. It is recommended that pseudomembranous colitis be considered in the differential diagnosis of any patient who develops a fever, ileus, or diarrhea during or soon after a course of clindamycin therapy.

5571 CAPILLARY LEAK SYNDROME WITH MASSIVE INTESTINAL EDEMA AFTER APPENDECTOMY. *(E.)* Fishbein, M. C.; State, D.; Hirose, F.; Castagna, J. (Harbor Gen. Hosp., Torrance, Ca.). *Am. J. Surg.* 127(6):740-747, 1974.

Ileus and ascites with persistent hypotension developed in a previously healthy 36-yr-old man after appendectomy for acute appendicitis. On the 5th postoperative day, laparotomy re-exploration revealed a grossly gangrenous-appearing segment of the terminal ileum and proximal colon and these were removed. Histologically, only massive acellular submucosal edema with dilation of lymphatics and a serosal hyperemia without necrosis were seen. Despite large amounts of fluid administration, central venous pressure never exceeded 20 cm H_2O, and the mean pulmonary artery pressure was always less than 15 mm Hg. Severe anasarca developed, and during the last day, a total of 3.6 liters of pleural fluid was removed. The patient died on the 6th postoperative day in a state of progressive shock, hypoxia, and anuria. Necropsy showed submucosal edema of the remaining large and small intestines, anasarca, and pulmonary atelectasis. Differential diagnoses of regional enteritis, acute nonspecific ileitis, infectious enterocolitis, iatrogenic accident, and allergic phenomena were considered. This case, however, was consistent with a diagnosis of capillary leak syndrome due to increased permeability of capillary membranes as manifested by hypovolemic shock, hemoconcentration, and anasarca in the absence of fluid overload, congestive failure, or blockage of lymphatic or venous channels. The cause of the capillary leakage producing massive edema of the bowel remains obscure. It is believed that this is an example of the rare, recently identified capillary leak syndrome which has so far not been reported as a postoperative complication of appendectomy.

5572 BOWEL TRANSIT-TIMES IN TWO POPULATIONS EXPERIENCING SIMILAR COLON-CANCER RISKS. *(E.)* Glober, G. A.; Klein, K. L.; Moore, J. O.; Abba, B. C. (Natl. Cancer Inst., Natl. Inst. Hlth., Bethesda, Md.). *Lancet* (7872):80-81, 1974.

To investigate the indirect relationship between dietary fiber intake and incidence of carcinoma of the colon suggested by the fact that as fiber is reduced, bowel transit time is lengthened and thus the risk for large intestine cancer would seem to increase, bowel transit time was measured in 86 men (50-75 yr old), 63 of whom were Japanese and 23 Caucasian, both groups living in Hawaii. Although the Japanese men shared the same risk for colonic cancer as did the Caucasians, the transit times were dissimilar: in the Japanese 32.3 hr with 1 stool/day as compared to 53.8 hr in Caucasians of the same age group. These differences could not be explained by body weight, surface area, number of bowel movements/day, occupation, or education. Results indicate, therefore, that bowel transit time is not related to the pathogenesis of colonic disease.

5573 ARE ELEMENTAL DIETS USEFUL IN BOWEL PREPARATION? *(E.)* Cooney, D. R.; Wassner, J. D.; Grosfeld, J. L.; Jesseph, J. E. (Indiana Univ. Sch. Med., Indianapolis). *Arch. Surg.* 109(2):206-210, 1974.

The efficacy of elemental diets and antibiotics in the preoperative preparation of the colon was evaluated in 90 Sprague-Dawley rats. Six groups of 15 animals each (8 males and 7 females) were used: the control group had no preparation and received standard rat chow, while the other 5 groups underwent a 4-day preoperative treatment with one of the special diets and with magnesium sulfate p.o. (200 mg/day) as a cathartic for the 1st 2 days. The diets consisted of (1) Vivonex; (2) Flexical (both elemental diets mixed with water to a final concentration of 1 calorie/ml); (3) clear liquids only; (4) clear liquids + i.m. kanamycin sulfate (15 mg/kg/day) and i.m. cephalothin sodium (50 mg/kg/day) 24 hr before operation and 72 hr after; and (5) clear liquids + antibiotics p.o. (10 mg neomycin sulfate and 50 mg lincomycin hydrochloride [Lincocin]). Partial colectomy and colon anastomosis were done on each animal. Observations on survival, weight changes preoperatively and 7 days postoperatively, mean tensile anastomatic strength, and the incidence of anastomotic leak and wound infection led to the following conclusions: (1) elemental diets or antibiotics were not superior to mechanical preparation alone; (2) elemental diets were as effective as orally administered antibiotics in decreasing the incidence of postoperative infection; (3) elemental diets did not prevent anastomotic leak or enhance anastomotic mean tensile strength; and (4) mechanical bowel emptying using clear liquids and cathartics remains the key to short-term preoperative colon preparation. In general, results here suggest that the added nutritional support of elemental diets may be of value, particularly in the chronic debilitated patient.

5574 CARCINOMA OF THE LARGE INTESTINE IN CHILDREN. *(E.)* Wolloch, Y.; Dintsman, M. (Tel Aviv Univ. Med. Sch., Israel) *Am. J. Surg.* 127(6):693-695, 1974.

Case reports are presented of cancer of the large bowel in 2 children, a 12-year-old boy and an 18-year-old girl. The boy experienced epigastric and periumbilical pain, anorexia, and loss of weight 3 weeks prior to hospitalization. Barium enema examination demonstrated an infiltrating lesion in the transverse colon, compatible with carcinoma, with prestenotic dilation of the bowel. At operation a tumor causing stenosis was found in the transverse colon with multiple metastases in the omentum, liver, peritoneum, and pelvis. On the 10th postoperative day, progressive jaundice occurred; he died 3 weeks later. The girl developed pain in the right iliac fossa and became constipated 1 year prior to admission. The pain subsided after treatment with laxatives and enemas, which she continued to use. One month before admission, she had a recurrence of lower abdominal pain, and fresh blood was observed intermittently in the stools. Rectosigmoidoscopic examination demonstrated a tumor 8 cm from the anal verge. At laparotomy, a mass the size of a fist was found at the rectosigmoid junction. Anterior resection of the rectosigmoid was performed along with transverse colostomy. After several months, intestinal function returned to normal. Sixteen years after operation, she had no symptoms referable to the gastrointestinal tract and no signs of recurrent disease. Cancer of the large bowel in children occurs very rarely (less than 1% occur in people under 30) and is characterized by a fulminating course and high mortality. In the majority of cases, cancer of the colon in children appears with no antecedent history of intestinal disease. The main reason for delay in establishing the diagnosis is the absence of a typical clinical picture in the majority of cases and the comparative rarity of the disease. The presenting symptoms can include: abdominal pain (90%), vomiting (40%), constipation (25%), rectal bleeding (18%), and weight loss (20%). The tumor may occur in any part of the colon, but the majority are found in the sigmoid colon. Barium enema and sigmoidoscopy represent the 2 most important tests for confirming the diagnosis. It is stressed that only an increased awareness of the possibility of carcinoma of the colon in children will lead to earlier detection of the disease and thereby to improvement in the generally poor prognosis in those cases.

5575 NONSPECIFIC ULCERS OF THE CECUM: REPORT OF TWO CASES. *(E.)* Lazarovitch, I.; Michowitz, M.; Lowenthal, M.; Solowiejczyk, M. (Tel Aviv Univ. Med. Sch., Israel) *Dis. Colon Rectum* 17(3):381-386, 1974.

Because of the rare occurrence of multiple ulcerations in the cecum, case reports of 2 such patients are presented to aid in accurate diagnosis. In a 32-yr-old woman who underwent surgery for the clinical diagnosis of acute appendicitis a large quantity of clear fluid was found in the peritoneal cavity. The cecal area was edematous, with an inflamed wall; palpation revealed a tumor 3 cm in diameter. Since malignancy could not be eliminated, right hemicolectomy was performed. The postoperative period was uneventful. The second patient, a 68-yr-old woman, showed melena and decrease in hemoglobin 1 week after treatment for femur injury due to a traffic accident. Two days later, at laparotomy, a large quantity of free air was found in the peritoneal cavity, with moderate inflammation of the peritoneum and some serous fluid and fibrin. The cecal wall was thickened. Because of suspicion of a malignant tumor, right hemicolectomy was performed. She died a week later of septic shock. No evidence of tuberculosis, amebiasis, or granuloma was found in these 2 cases. In general, since accurate diagnosis of this disease before operation is virtually impossible, treatment must be surgical. Colectomy should be performed in most cases because of the difficulty in excluding malignancy during an emergency operation and because suture of an inflamed and edematous wall may be hazardous. From the histopathologic point of view, the cases of nonspecific ulcer of the cecum do not resemble the more frequent cases of ulceration of the large intestine which are caused by ulcerative colitis, Crohn's disease, and other disorders.

5576 THE SPECTRUM OF LINCOMYCIN-CLINDAMYCIN COLITIS. *(E.)* Viteri, A. L.; Howard, P. Y.; Dyck, W. P. (Scott and White Clin., Temple, Tex.). *Gastroenterology* 66(6):1137-1144, 1974.

The clinical course, endoscopic findings, and roentgenographic features of seven cases of mild to severe colitis in previously healthy subjects after p.o. or parenteral adminstration of lincomycin or clindamycin were studied. The drugs used their routes and dosages were: i.m. lincomycin (600 mg/day) for 7 days; p.o. lincomycin (dosage unknown); and p.o. clindamycin (600 mg/day) for 9, 7, and 10 days. One subject presented a history of a similar but milder illness 2 yr earlier after an exposure to lincomycin. Mild reactions were characterized by bloodless, watery diarrhea without fever or leukocytosis, and minimal proctoscopic and radiological findings. Severe illness was associated with severe abdominal discomfort, fever, marked leukocytosis, and proctoscopic and roentgenographic evidence of severe mucosal ulceration, as well as pseudomembrane and pseudopolyp formation. The proctoscopic findings included edema, mucosal friability, pseudomembranes, superficial ulcerations, and pseudopolyps. The symptoms lasted from 4-8 weeks. After a clinical course of supportive management including Lomotil and i.v. fluid, all patients returned to normal health with reversal of the proctoscopic and roentgenographic abnormalities. No recurrence of symptoms has been noted during follow-up periods of several months to 3 yr.

5577 COLITIS CYSTICA PROFUNDA. *(E.)* Green, G. I.; Ramos, R.; Bannayan, G. A.; McFee, A. S. (Univ. Texas Med. Sch., San Antonio). *Am. J. Surg.* 127(6):749-752, 1974.

Features of a benign condition, colitis cystica profunda, which must be differentiated from colonic mucinous adenocarcinoma to avoid unnecessary radical operations are presented together with endoscopic views to aid in visual recognition. The 25 yr old female patient had passed excessive mucus and blood per rectum since age 8. She underwent hemorrhoidectomy without improvement in symptoms at age 16; 4 yr later, perianal condylomas were resected. Since then, the mucus discharge and rectal bleeding increased in frequency to several times per week. Proctoscopic examination revealed a 2 by 1 cm erythematous submucosal lesion extending 4 to 6 cm above the dentate line with several superficial ulcerations measuring 1 to 2 mm on the mucosal surface of the lesion. Under caudal anesthesia, local excision of the lesion was performed. The pathologist reported glandular mucus-filled cysts deep to the muscularis mucosae, some of which were lined with normal-appearing epithelium. Grossly the mucosa overlying the cysts in colitis cystica profunda, may show irregularly distributed areas of edema, hyperemia, hypertrophy, and atrophy with occasional superficial ulcteration or central umbilication. Microscopically, the cysts lie deep to the muscularis mucosae, and are lined with normal-appearing columnar epithelium or may merely be filled with mucus which stains faintly basophilic. Colitis cystica profunda could be of congenital origin, representing hamartoma formation; however, chronic inflammation has been accepted by most investigators as the primary etiologic factor. Physical findings in the 52 known cases of colitis cystica profunda were rectal mass or polyp, 40 cases; stenosis, 4; ulcerative colitis, 6; abnormal barium enema, 18; and rectal prolapse 5. Symptoms and signs of rectal bleeding occurred 33 times; diarrhea, 16; mucus stools, 17; pain, 9; tenesmus, 7; weight loss, 4; and previous rectal surgery, 12. Colitis cystica profunda should be included in the differential diagnosis of any rectal or colonic polypoid or intramural mass.

5578 IS OBSTRUCTIVE LUNG DISEASE A CAUSE OF PNEUMATOSIS COLI? *(Fl.)* Dolmans, S.; Bostoen, H.; Allegaert, W. (St. Maarten Hosp., Kortrijk, Belgium). *Tijdschr. Gastroenterol.* 16(4):254-263, 1973.

5579 RADIOTHERAPY FOR ANAL CARCINOMA. *(Fr.)* Paunier, J. P.; Tschopp, M. (Cantonal Hosp., Geneva, Switzerland). *Radiol. Clin. Biol.* 43(4):341-343, 1974.

5580 RECTAL CANCER (LECTURE). *(Rus.)* Kozhevnikov, A. I. (Gor'ki Med. Inst., USSR). *Sov. Med.* 36(4):43-45, 1973.

5581 RADIOLOGICAL FEATURES OF COLONIC DIVERTICULOSIS AND ITS COMPLICATIONS. *(Rus.)* Khaspekov, G. E.; Gazetov, B. M. (N. A. Semashko Central Clin. Hosp., Moscow, USSR). *Vestn. Rentgenol. Radiol.* (2):38-44, 1973.

5582 INTESTINAL DYSKINESIA FOLLOWING DYSENTERY. *(Rus.)* Bronshtein, A. S.; Marko, O. P.; Belova, T. V.; Kolosov, I. A.; Chizhov, E. A.; Maiman, E. G.; Obydenova, T. V.; Dubinin, A. V. (Gor'ki Sci. Res. Inst. Exp. Med., USSR). *Sov. Med.* 36(5):53-56, 1973.

5583 IRRITABLE BOWEL SYNDROME. *(Fl.)* Ponette, S. (St. Rafael Univ. Hosp., Louvain, Belgium). *Tijdschr. Geneesk.* 29(13):642-647, 1973.

5584 MULTIPLE POLYPS OF THE LARGE INTESTINE. *(Rus.)* Baranova, A. E. (Vladivostok Med. Inst., USSR). *Vestn. Rentgenol. Radiol.* (2): 98-100, 1973.

5585 CLINDAMYCIN-ASSOCIATED PSEUDOMEMBRANOUS COLITIS: A PROSPECTIVE STUDY. *(E.)* Tedesco, F. J.; Halford, M. B.; Alpers, D. H. (Washington Univ. Sch. Med., St. Louis). *Gastroenterology* 66(4):788, 1974.

5586 DOES APPENDECTOMY PREDISPOSE TO INGUINAL HERNIA? A RETROSPECTIVE STUDY AND ELECTROPHYSIOLOGICAL INVESTIGATIONS. *(E.)* Orda, R.; Wiznitzer, T.; Solzi, P.; Najenson, T.; Papa, M. (Ichilov Hosp., Tel Aviv, Israel). *Am. Surg.* 40 (6):349-351, 1974.

5587 COMPLICATIONS OF DIVERTICULITIS OF THE COLON. *(E.)* Mangold, G.; Pross, E. (Surg. Clin., Univ. Mainz, Germany). *Abdom. Surg.* 16(6):166-167, 1974.

5588 ANORECTAL MALIGNANT MELONOMA. A REPORT OF FOURTEEN CASES. *(E.)* Husa, A.; Hockerstedt, K. (Univ. Central Hosp., Helsinki, Finland). *Acta Chir. Scand.* 140(1):68-72, 1974.

5589 VILLOUS ADENOMA WITH SEVERE FLUID IMBALANCE. *(E.)* Gjores, J. E.; Orndahl, B. (Vaxjo Gen. Hosp., Sweden). *Acta Chir. Scand.* 140(1):82-84, 1974.

5590 BENIGN AND MALIGNANT TUMOURS OF THE APPENDIX. *(E.)* Adolfsson, G. (Central Hosp., Kalmar, Sweden). *Acta Chir. Scand.* 140(2):151-155, 1974.

5591 RECURRENCE OF CARCINOMA OF THE LARGE INTESTINE: A STATISTICAL REVIEW. *(E.)* Shindo, K. (Osaka Univ. Hosp., Japan). *Am. J. Proctol.* 25(3):80-90, 1974.

5592 SIGMOID VOLVULUS: A NEW CONCEPT IN TREATMENT. *(E.)* Tanga, M. R. (H.K.E.S. Med. Coll., Gulbarga, India). *Am. J. Surg.* 128(1):119-121, 1974.

5593 PATHOLOGY OF COLONIC POLYPS AS IT RELATES TO SURGICAL MANAGEMENT. *(E.)* Enterline, H. T. (Hosp. Univ. Pennsylvania, Philadelphia). *Ann. Clin. Lab. Sci.* 4(3):145-150, 1974.

5594 TOPICAL AMPICILLIN IN THE PREVENTION OF WOUND INFECTION AFTER APPENDICECTOMY. *(E.)* Bates, T.; Down, R. H. L.; Houghton, M. C. V.; Lloyd, G. J. (Guy's Hosp., London, England). *Br. J. Surg.* 61(6):489-492, 1974.

5595 INHIBITION OF ROSETTE-FORMING ACTIVITY OF LYMPHOCYTES IN PATIENTS WITH BOWEL CANCER BY A COLORECTAL TUMOUR EXTRACT. *(E.)* McIllmurray, M. B.; Langman, M. J. S. (City Hosp., Nottingham, England). *Gut* 15(4):345, 1974.

5596 MUCIN CHANGES IN COLONIC MUCOSA IN COLORECTAL CARCINOMA. *(E.)* Filipe, M. I.; Branfoot, A. C.; Cooke, B. K. (Westminster Med. Sch., London, England). *Gut* 15(4):345, 1974.

5597 HEREDITY AND BOWEL CANCER. *(E.)* Lovett, E.; (St. Mark's Hosp., London, England). *Gut* 15(4):345, 1974.

5598 THE DIAGNOSIS OF PSEUDOMEMBRANOUS COLITIS BY RECTAL BIOPSY. *(E.)* Price, A. B.; Davies, D. R. (St. Mark's Hosp., London, England). *Gut* 15(4):346-347, 1974.

5599 EPIDEMIOLOGY OF LARGE BOWEL DISEASE: THE ROLE OF FIBRE. *(E.)* Burkitt, D. P. (Med. Res. Council, London, England). *Proc. Nutr. Soc.* 32(3):145-149, 1973.

5600 ELECTROCOAGULATION OF GASTROINTESTINAL POLYPS USING FIBROSCOPIC CONTROL: TWENTY-SIX CASES. *(Fr.)* Rachail, M.; Corallo, J.; Pellet, D. (Univ. Hosp. Ctr., Grenoble, France). *Nouv. Presse Med.* 3(21):1375-1379, 1974.

5601 SURGICAL TREATMENT OF DIVERTICULITIS OF THE LARGE INTESTINE. *(Ger.)* Heberer, G.; Hoffmann, K.; von Bary, S.; Nakano, H. (Surg. Clin., Univ. Munich, Germany). *Munch. Med. Wochenschr.* 116(21):1075-1080, 1974.

5602 DIVERTICULOSIS AND DIVERTICULITIS OF THE LARGE INTESTINE. *(Ger.)* Ottenjann, R. (Neuperlach Munic. Hosp., Munich, Germany). *Munch. Med. Wochenschr.* 116(21):1069-1074, 1974.

5603 A CASE OF FAMILIAL POLYPOSIS OF THE LARGE INTESTINE. *(Pol.)* Oczadly, P.; Bak, W. (Munic. Hosp., Tychy, Poland). *Wiad. Lek.* 27(2):173-176, 1974.

5604 CONSERVATIVE TREATMENT OF INTESTINAL FISTULAS IN CHILDREN. *(Rus.)* Zakrevskii, G. I. (Minsk Med. Inst., USSR). *Vestn. Khir.* 111(11):80-82, 1973.

5605 CANDIDA IN PATIENTS WITH CHRONIC ENTEROCOLITIS. *(Rus.)* Smirnova, T. V.; Khodykin, A. V.; Ivanova, A. S.; Irtseva, V. M.; Trotsan, L. K. (Dnepropetrovsk Sci. Res. Inst. Gastroenterol., USSR). *Vrach. Delo* (5):100-104, 1974.

5606 THERAPEUTIC EFFECTS OF MEXAFORM, MEXASE, AND FESTAL IN PATIENTS WITH CHRONIC ENTEROCOLITIS. *(Rus.)* Morozov, K. A.; Valenkevich, L. N. (Leningrad Pediatr. Med. Inst., USSR). *Vrach. Delo* (5):97-100, 1974.

5607 BLEEDING FROM DIVERTICULA OF THE DESCENDING AND SIGMOID COLON. *(Pol.)* Jedrzejczyk, W.; Kruszynski, J.; Strusiewicz, J.; Chomicz, J.; Buczkowski, M. (Hlth. Care No. 1, Dept. Surg. Dis., Torun, Poland). *Pol. Przegl. Chir.* 45(12):1449-1451, 1973.

See also, 5041, 5379, 5408, 5414, 5416, 5533, 5550, 5598, 5600, 5615.

LARGE INTESTINE

Ulcerative Colitis

5608 THE IMMUNE COMPETENCE OF PATIENTS WITH INFLAMMATORY BOWEL DISEASE. *(E.)* Bolton, P. M.; James, S. L.; Newcombe, R. G.; Whitehead, R. H.; Hughes, L. E. (Welsh Natl. Sch. Med., Cardiff, Wales). *Gut* 15(3):213-219, 1974.

Immune competence was studied in 52 patients with Crohn's disease: 20 with ulcerative colitis, and 46 controls with benign gastrointestinal disease. According to clinical state of disease, the patient groups were further subdivided into asymptomatic and symptomatic groups. At time of testing 27 patients with Crohn's disease and 7 with ulcerative colitis were receiving steroid therapy. The 5 parameters of immune function tested were peripheral lymphocyte count, serum immunoglobulin levels (IgG, IgA, and IgM), lymphocyte response to phytohemagglutinin, Mantoux reaction, and dinitrochlorobenzene response. The peripheral blood lymphocyte count and lymphocyte response to phytohemagglutinin were similar in all patient groups. Serum IgA levels were elevated in Crohn's disease and were significantly higher in the symptomatic than in the asymptomatic subgroup. Mantoux and dinitrochlorobenzene responses were depressed only in symptomatic Crohn's disease patients on steroid therapy. Four patients with ulcerative colitis, 14 with Crohn's disease, and 33 controls subsequently underwent surgery. Serial immune testing during the 4th postoperative week showed that surgery had no effect on lymphocyte count, lymphocyte response to phytohemagglutinin, or serum IgG level in any group. Serum IgA values fell significantly in the Crohn's group after surgery and nonsignificantly in control patients. Serum IgM levels following surgery were increased in Crohn's disease patients and the symptomatic control subgroup. The results provide no evidence of impairment of immune competence in either Crohn's disease or ulcerative colitis.

5609 PROSPECTIVE STUDY OF OUTPATIENTS WITH EXTENSIVE COLITIS. *(E.)* Lennard-Jones, J. E.; Parrish, J. A.; Misiewicz, J. J.; Ritchie, J. K.; Swarbrick, E. T.; Williams, C. B. (St. Mark's Hosp., London, England). *Lancet* (7866): 1065-1067, 1974.

Extensive colitis in 171 patients was followed up on an outpatient basis for up to 7 yr. Death occurred in 7 patients. Carcinoma of the large bowel developed in 3, all of whom have remained well 7, 6, and 2 yr after operation. In these 3 patients dysplasia was observed on rectal mucosal biopsy, and no patient in this series developed carcinoma without this abnormality present. Epithelial dysplasia was noted on rectal biopsy in 11 other patients, 4 of whom underwent colectomy without evidence of carcinoma in the operative specimen. Colectomy was undertaken without mortality in 7 patients during a severe attack of colitis and in 22 electively. Surgical treatment is recommended for a patient with extensive colitis if a severe attack does not respond to medical treatment rapidly. Elective operation is advised for recurrent acute attacks or if the patient is persistently unwell. For a patient who is well, colectomy is advised if the cancer risk seems high; the factors to be considered are the length of history, the radiological appearances of the colon, and the presence of epithelial dysplasia observed in serial biopsies. Regular barium enema and colonoscopy should be included in the management, especially for patients with a history of more than 10 yr. Where circumstances prevent close follow-up, elective surgery for extensive colitis may be the safest course.

5610 ULCERATIVE COLITIS IN ELDERLY PATIENTS. *(E.)* Toghill, P. J.; Benton, P. (Gen. Hosp., Nottingham, England). *Gerontol. Clin.* 15(2): 65-73, 1973.

In a series of 303 patients with ulcerative colitis, 19 developed initial symptoms after the age of 65. Thirteen patients survived their initial attack of colitis. Most of these patients were treated medically with systemic and topical steroids together with salicylazosulfapyridine. Two patients achieved complete and lasting remission, 5 patients improved but subsequently developed relapses, and 3 remained unchanged. One patient underwent emergency proctocolectomy for perforation of the colon at the age of 67. Two deaths occurred after initial improvement of the colitis on medical treatment. Six patients died of acute toxic dilatation or perforation of the colon within 6 months of the onset of their colitis without experiencing any clinical improvement. None of the 19 patients developed colonic or rectal carcinomas. No examples of chronic liver disease, skin lesions, sacro-ileitis or ankylosing spondylitis were seen. Autopsy findings showed no specific features of ulcerative colitis in the elderly which would distinguish it from that seen in younger patients. One of the great difficulties in the diagnosis of ulcerative colitis in the elderly is its distinction from ischemic colitis. If the high mortality resulting from acute attacks of colitis in old age is to be improved upon, it seems likely that this will come from more accurate diagnosis and earlier resort to surgery.

5611 IMMUNOHISTOCHEMICAL CHARACTERIZATION OF LOCAL IMMUNOGLOBULIN FORMATION IN ULCERATIVE COLITIS.

(E.) Brandtzaeg, P.; Baklien, K.; Fausa, O.; Hoel, P. S. (Rikshosp., Oslo, Norway). *Gastroenterology* 66(6):1123-1136, 1974.

Immunohistochemical studies of the human intestinal immunocytes were performed in 8 patients with active ulcerative colitis and compared to 6 control patients without overt inflammation. The following characteristics existed in colon tissue specimens. (1) Persisting glands seemed to mediate a normal external transport of IgA and IgM via secretory component-producing columnar epithelial cells. (2) The average total numbers of mucosal IgA and IgM immunocytes in areas with persisting glands were raised 2.2 and 5.2 times, resp. (3) The average total number of mucosal IgG immunocytes in such areas was raised about 30 times, and the submucosa, in addition, contained a fairly dense immunocyte population with 84% IgG cells. In sections of directly fixed material, the connective tissue ground substance exhibited a diffuse, general fluorescence for IgG, which was especially intense in the basement membrane zones and vessel walls. This study suggests that a primary defect in the local secretory immunoglobulin system cannot explain the development of ulcerative colitis. A pronounced local IgG immunocyte response is associated with the pathogenesis of this disease, and regardless of the initiating etiological factor(s), these locally produced IgG antibodies may directly, or in cooperation with lymphocytes, be responsible for chronicity and recurrences.

5612 EVIDENCE OF CYTOTOXICITY IN ULCERATIVE COLITIS FROM IMMUNOFLUORESCENT STAINING OF THE RECTAL MUCOSA.

(E.) Ballard, J.; Shiner, M. (Central Middlesex Hosp., London, England). *Lancet* 1(7865):1014-1017, 1974.

Tissue immunofluorescent studies on mucosal complement in ulcerative colitis were made on 17 rectal mucosal biopsy samples from 11 patients with ulcerative colitis as well as biopsy specimens from 5 control subjects with diarrhea, constipation, or irritable bowel. In all colitis patients, the number of IgG-containing plasma cells was greatly increased, being highest in the most active disease cases. Increases in IgA plasma cells occurred in 10 of the 17 biopsy specimens, and IgM plasma cells were increased in 6. The increase in IgG plasma cells in the rectal mucosa suggests that the bacterial antigen stimulates local, not systemic, IgG production. There was also intense immunofluorescent staining of rectal mucosa connective tissue with IgG antisera, and a similar staining pattern was seen with the C3 component of complement in the colitis patients. This would indicate a reaction between these immunoglobulins and antigen resulting in a complement-binding complex. Such a complement deposit in the rectal mucosa suggests a cytotoxic reaction that may account for the pathological features of ulcerative colitis, such as ulceration.

5613 INTENSIVE INTRAVENOUS REGIMEN FOR SEVERE ATTACKS OF ULCERATIVE COLITIS.

(E.) Truelove, S. C.; Jewell, D. P. (Radcliffe Infirmary, Oxford, England). *Lancet* (7866):1067-1070, 1974.

Over a 5-yr period, a 5-day intensive intravenous regimen designed for treatment of severe ulcerative colitis attacks was used on 49 patients with this disease, some having their first attack, others being in relapse. The routine of this regimen was as follows: (1) Nothing except sips of water was allowed p.o. (2) At least 3 liters of fluid/day were given i.v., consisting of saline, glucose, blood, and sometimes parenteral feeding nutrients, with potassium supplementation as required. In addition, prednisolone-21-phosphate (60 mg/day), tetracycline (250 mg 4 times/day), and B vitamins as well as ascorbic acid were all i.v. administered. (3) A rectal drip supplied 100 mg hydrocortisone succinate sodium in approximately 120 ml saline twice daily. At the end of the course, 36 of the 49 patients were in complete remission. In a small proportion of patients who went into remission relapse soon after being switched to oral therapy after 5 days of the regimen, a second administration of the 5 day routine was attempted; but this procedure was almost universally unsuccessful. Such relapses are now regarded as a firm indication for urgent surgery. Four patients showed clinical improvement without remission, but they all required surgery within the next 6 weeks. The remaining 19 patients were unchanged, and the complete failure to improve was an absolute signal for emergency surgery. Likewise, any deterioration during the 5-day course was considered an indication for emergency operation without waiting to complete the course. This regimen gives a higher remission rate than has been recorded for other treatments; when used in treatment of first attacks of ulcerative colitis, a considerable chance of prolonged remission is seen. In this study, 2/3 of the first-attack patients who went into remission remained symptom-free during a follow-up period which averaged more than 3 yr.

5614 HISTOLOGICAL AND HISTOCHEMICAL CHANGES IN THE JEJUNAL MUCOSA IN ULCERATIVE COLITIS.

(E.) Binder, V.; Soltoft, J.; Gudmand-Hoyer, E. (Gentofte Hosp., Hellerup, Denmark). *Scand. J. Gastroenterol.* 9(3):293-297, 1974.

Jejunal biopsy specimens were obtained at the ligament of Treitz from 21 patients suffering from severe ulcerative colitis. Biopsy was repeated in 14 of the patients after remission of the colon disease. Eleven of the 21 patients with active colitis had minor changes in the villus patterns, while 10 showed a normal mucosal structure. The surface/volume ratio was found to be significantly lower in active than in inactive colitis even in the mucosal biopsy specimens without visible histological changes; and villus changes were not correlated to the degree of diarrhea nor to the degree of general disease (i.e. weight loss, anemia, fever). Judged by an estimation of the cell density in the lamina propria, there were no signs of inflammation in the mucosal stroma in active disease compared to inactive. Functionally, no consistent changes were found in the oxidative enzymes in the epithelial cells. Acid and alkaline phosphatases were inconsistently lowered in active as well as in inactive ulcerative colitis, and so were β-galactosidase and α-glucosidase. Possibly, the generally affected physical state is a cause of the changes in the small intestine in ulcerative colitis.

5615 COMPARISON OF CLINICAL AND MICROBIOLOGICAL PARALLELS IN PATIENTS WITH NONSPECIFIC ULCERATIVE COLITIS AND CHRONIC COLITIS. *(Rus.)* Smirnova, T. V.; Khodykin, A. V.; Ivanova, A. S.; Iartseva, I. M.; Granovskii, N. M.; Kushch, A. N. (Dnepropetrovsk Sci. Res. Inst. Gastroenterol., USSR). *Sov. Med.* 36(5):88-92, 1973.

5616 THE SIGNIFICANCE OF COLONIC DYSKINESIA IN THE DIAGNOSIS OF NONSPECIFIC ULCERATIVE COLITIS. *(Rus.)* Karnaukhov, V. K. (E. I. Martsinovskii Inst. Med. Parasitol. Tropical Med., Moscow, USSR). *Sov. Med.* 36(4):97-100, 1973.

5617 EXPERIENCE IN THE TREATMENT OF NONSPECIFIC ULCERATIVE COLITIS. *(Rus.)* Karnaukhov, V. K. (E. I. Martsinovskii Inst. Med. Parasitol. Tropical Med., Moscow, USSR). *Sov. Med.* 36(5): 93-97, 1973.

5618 CHRONIC INORGANIC MERCURY POISONING DUE TO LAXATIVE ABUSE. A CLINICAL AND ULTRASTRUCTURAL STUDY. *(E.)* Wands, J. R.; Weiss, S. W.; Yardley, J. H.; Maddrey, W. C. (Johns Hopkins Hosp., Baltimore, Md.). *Am. J. Med.* 57(1):92-101, 1974.

5619 EFFECTS OF SULPHASALAZINE (SALAZOPYRIN) ON FAECAL FLORA IN PATIENTS WITH INFLAMMATORY BOWEL DISEASE. *(E.)* Lendrum, R.; Walker, J. G.; West, B.; Hill, M. J. (St. Mary's Hosp., London, England). *Gut* 15(4):344, 1974.

5620 A PROSPECTIVE FOLLOW UP OF OUTPATIENTS WITH 'TOTAL COLITIS'. *(E.)* Lennard-Jones, J. E.; Misiewicz, J. J.; Parrish, J. A.; Ritchie, J. K.; Swarbrick, E. T.; Williams, C. B. (St. Mark's Hosp., London, England). *Gut* 15(4):344-345, 1974.

5621 B LYMPHOCYTES IN INFLAMMATORY BOWEL DISEASE. *(E.)* Ramachandar, K.; Sachar, D. B.; Janowitz, H. D.; Forman, S. P.; Douglas, S. D.; Taub, R. N. (Mt. Sinai Hosp., N.Y.). *Lancet* (7871):45-46, 1974.

See also, 5731.

PANCREAS

5622 UNUSUAL DIAGNOSTIC ASPECTS AND CURRENT MANAGEMENT OF PANCREATIC PSEUDOCYSTS. *(E.)* Gilman, P. K.; Gibbons, J. C.; Kaplan, M. S.; Juler, G. L. (Univ. California, Irvine, Sch. Med.). *Am. Surg.* 40(6):326-334, 1974.

Records of pancreatic pseudocyst patients (22-78 yr old) over a 9 yr period were reviewed to determine the frequency of correct diagnosis and best diagnostic methods as well as to clarify the best type of drainage to be used. In this study, 78 cases of pancreatic pseudocyst showed that 51 patients (65%) had surgical treatment and 27 patients (35%) were managed medically. Of the latter, 5 patients (18.5%) died and diagnosis was confirmed only at autopsy while the remaining 22 (81.5%) were discharged after 1-3 weeks of therapy. Postoperative problems appeared in 7 (20%) of the 37 patients treated by internal drainage, whereas 11 (78%) of the 14 with external drainage had significant complications; these 18 patients represented 36% of the 51 surgically treated cases. The overall rates of surgical morbidity (36%) and mortality (11.7%) were related to problems of sepsis, hemorrhage, fistula, and recurrence of the pseudocyst. However, when internal drainage was feasible, the morbidity and mortality rates were reduced to 20% and 5.5% resp. Methods used to confirm diagnoses were clinical findings and barium swallow 84%, and special roentgenographic studies for the remaining 16%. The latter were most useful, next to barium swallow used in 70% of the cases. Results here demonstrate that constant awareness, early diagnosis, and internal drainage of pancreatic pseudocyst are essential to reduce the complications and mortality rates of this disease.

5623 IMPORTANCE OF PATHOLOGIC STAGING IN THE SURGICAL MANAGEMENT OF ADENOCARCINOMA OF THE EXOCRINE PANCREAS. *(E.)* Hermreck, A. S.; Thomas, C. Y.; Friesen, S. R. (Univ. Kansas Med. Ctr., Kansas City). *Am. J. Surg.* 127(6):653-657, 1974.

A retrospective analysis of 348 patients with adenocarcinoma of the exocrine pancreas diagnosed at operation was performed to determine the effects of the stage of the disease on survival time with and without definitive surgical treatment. The extent of the disease as judged by operative and histologic findings at the time of operation was as follows: stage I, local disease only; stage II, invasion of surrounding tissues; stage III, regional node metastases; and stage IV, generalized carcinoma. The mean time of survival in 125 patients who underwent laparotomy and biopsy only for diagnosis was 0.15 year with no significant difference in survival time for the 4 different stages of diseases. The 172 patients who underwent palliative procedures had a mean survival time of 0.42 year. Survival time was significantly better for patients with stage I, stage II, and stage III diseases after palliative procedures, whereas with stage IV disease, survival was similar to that seen with laparotomy only. The 51 patients who underwent excisional procedures had a mean survival time of 0.95 year. Resections for stage I and stage II disease resulted in survival time of 1.4 and 1.2 years, respectively. However, for stage III and stage IV disease, the survival time after resection was almost identical to that observed with palliative procedures only. Resection procedures in patients with metastasis to lymph nodes have not resulted in any 5-year survivors, nor has the average survival been extended beyond that seen with palliatuve procedures. This study reveals that survival time for stage I and stage II disease is significantly longer after excision procedures, whereas for stage III disease palliative procedures yield survival expectations similar to those for resections.

5624 AN UNUSUAL CASE OF ADENOCARCINOMA OF THE PANCREAS.

(E.) Baer, J. W. (St. Luke's Hospital Center, Columbia College of Physicians and Surgeons, New York, N.Y.). *Am. J. Dig. Dis.* 19(7): 667-672, 1974.

Cystic calcified mucin-secreting adenocarcinoma of the pancreas, disclosed upon laparotomy of a 41 year old woman, is described to emphasize radiographic similarities and differences between two rare conditions: cystic adenocarcinoma and papillary cystadenocarcinoma of the pancreas. Laparotomy disclosed a large left upper quadrant cystic structure measuring 30 cm at its greatest diameter. A thick gelatinous material (2500 ml) was drained from the cyst. Due to attachment of the mass to the aorta, the lesion was not removed. Biopsy at surgery revealed pancreatic invasion by large signet-ring cells with clear cytoplasm and eccentric nuclei; these cells produced a large amount of mucin. Very dense hyalinized fibrous connective tissue containing lymphocytes and many calcium fragments composed the cyst wall. Death 10 months after surgery was due to extrahepatic biliary obstruction. The clinical presentation, the roentgenologic manifestation of a well circumscribed calcified mass, the lack of perineural invasion, and the paucity of distant metastasis suggested cystadenocarcinoma of the pancreas. Papillary fronds whose identification by angiographic and pathologic examination may lead to such a diagnosis are often destroyed by prolonged intracystic pressure. Calcium within the cyst wall did not help to differentiate between cystadenocarcinoma and mucinous adenocarcinoma of the pancreas. As in other areas of the gastrointestinal tract, the ability of a tumor to produce mucin appears to be the catalyst for calcium deposition. It may be that mucinous adenocarcinoma of the pancreas is a variant of cystadenocarcinoma of the pancreas.

5625 CYSTADENOMA OF THE PANCREAS. REPORT OF A CASE AND ITS ARTERIOGRAPHIC DIAGNOSIS.

(E.) Cheung, L.; Matolo, N.; Maxwell, J. G. (Univ. Utah Med. Ctr., Salt Lake City). *Gastroenterology* 67(1):155-158, 1974.

Cystadenoma of the pancreas in a 50 yr old white female is described in this report. The gross appearance of this neoplastic cyst at 1st laparotomy led to the diagnosis of pancreatic pseudocyst which was treated by internal drainage through a cystogastrostomy. Serum amylase was normal both before and after surgery. Postoperatively, the patient's condition deteriorated. At a 2nd hospital, the arteriographic appearance of the tumor's vascular pattern was helpful in differentiating cystadenoma from pseudocyst and carcinoma. Radical resection of this large cystic tumor was accomplished in a second operation by subtotal pancreatectomy, splenectomy, and wedge resection of the stomach. Cystadenoma and pseudocyst may be similar in gross appearance, but characteristic arteriographic features are exhibited by the cystadenoma which may be helpful in establishing a diagnosis. Total excision is the treatment of choice for this unusual condition.

5626 VAGOTOMY AND THE EXTERNAL FUNCTION OF THE PANCREAS.

(E.) Kramhoft, J.; Balslev, I.; Lindahl, F.; Backer, O. G. (Frederiksberg Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(3):309-311, 1974.

In 18 patients operated on for duodenal ulcer with vagotomy (10 selective and 8 truncal) and with pyloroplasty, the exocrine function of the pancreas was evaluated using the amylase concentration, after administration of a test meal, in duodenal aspirate collected at 20 min intervals for 2 hr, before and from 3 to 18 months (average 6 months) after the operation. Since drainage procedure was identical in all patients and a preoperative examination of amylase secretion did not reveal any differences in the exocrine function of the pancreas, the vagotomy method used represented the only premeditated variable. No significant changes were found after selective vagotomy, but after truncal vagotomy there was a significant increase in the amylase concentration. Suggested causes for the intensified pancreatic function after truncal vagotomy include (1) hypersensitivity brought about by denervation; (2) changes in the release levels of cholecystokinin; (3) inhibitory fibers of the vagus being severed; and (4) changes in passage through the duodenum, due to the operation itself, thereby resulting in a change in enzyme concentration.

5627 DETECTION OF CIRRHOSIS IN CYSTIC FIBROSIS; LACK OF CORRELATION WITH GAMMA GLU-

TAMYL TRANSPEPTIDASE AND BILIARY TRACT ROENTGENOGRAMS. *(E.)* Isenberg, J. N.; L'Heureux, P.; Warwick, W. J.; Sharp, H. L. (Univ. Minnesota, Minneapolis). *Gastroenterology* 66(4):887, 1974.

5628 ENHANCED FOLIC ACID ABSORPTION IN PANCREATIC INSUFFICIENCY: ASSESSMENT OF FOLATE BINDING CAPACITY OF PANCREATIC PROTEINS. *(E.)* Russell, R. M.; Chang, H.; Rosenberg, I. H. (Dept. Med., Univ. Chicago, Ill.). *Gastroenterology* 66(4):873, 1974.

5629 EXPLORATION AND TRANSAMPULLARY DRAINAGE OF THE PANCREATIC DUCT. *(Fr.)* Sanchez Zinny, J. (Fac. Med., Buenos Aires, Argentina). *Lyon Chir.* 70(2):101-102, 1974.

5630 PLASMA LEVELS OF AMINO ACIDS AND GLUCAGON IN PATIENTS WITH PANCREATIC GLUCAGONOMAS. *(E.)* Mellinson, C. N.; Cox, B.; Bloom, S. R. (Greenwich Hosp., London, England). *Gut* 15(4):340, 1974.

5631 VASCULAR BRUITS IN PANCREATIC CARCINOMA. *(Pol.)* Wawrzynek, Z.; Smolarz, W. (Silesian Acad. Med., Katowice, Poland). *Pol. Przegl. Radiol.* 37(6):745-750, 1973.

5632 CLINICAL AND PATHOLOGICAL MANIFESTATIONS OF PRIMARY PANCREATIC CARCINOMA. *(Pol.)* Florkiewicz, H.; Pawlowska-Wakowicz, B.; Bednarzewski, J. (Acad. Med., Lublin, Poland). *Wiad. Lek.* 27(1): 1-5, 1974.

See also, 5159, 5160, 5161, 5293, 5365, 5366, 5370, 5371, 5378, 5380, 5381, 5386, 5404, 5407, 5409, 5414, 5420, 5641.

PANCREAS

Pancreatitis

5633 INFLAMMATORY MASSES FOLLOWING ACUTE PANCREATITIS: PHLEGMON, PSEUDOCYST, AND ABSCESS. *(E.)* Warshaw, A. L. (Massachusetts Gen. Hosp., Boston). *Surg. Clin. North Am.* 54(3):621-636, 1974.

Management of inflammatory masses which appear after acute pancreatitis depends on the specific nature of the lesion. Such masses fall into 3 categories: phlegmon, pseudocyst, and abscess, each of which is unique. Phlegmons are common, occur soon after onset of the attack, and usually resolve spontaneously over a few weeks during treatment for acute pancreatitis. Only in cases of long symptomatic persistence or development of secondary complications, such as abscesses, is surgical treatment necessary. Pseudocysts, apparently much less common, most often require drainage to abort symptoms or forestall complications. It is preferable to allow the pseudocyst to mature for 4 to 6 weeks to permit safe internal drainage by cystenterostomy. The incidence of abscesses after pancreatitis, 4% overall, increases with the severity of the attack and the degree of resulting tissue necrosis. It is felt that the abscess may result from secondary infection of a pseudocyst or phlegmon. Recognition or strong suspicion of pancreatic abscess requires immediate abdominal exploration and drainage.

5634 GALLSTONE PANCREATITIS. *(E.)* Kelly, T. R. (Akron City Hosp., Ohio). *Arch. Surg.* 109(2):294-297, 1974.

Over a 15 yr period, biliary tract surgery performed on 52 patients (average age 55 yr, 37 females and 12 males, 3 unidentified) with gallstone pancreatitis was marked by a minimum of complications and no mortality. In those patients operated on during the acute phase of the pancreatitis, the pancreas appeared to be either mildly or severely inflamed. In 35.7% of the patients with surgery after regression of symptoms, the pancreas appeared grossly normal. Cholelithiasis was present in all 52 patients, and the gallstones were located in the gallbladder in 49 (94.2%) patients, in the common bile duct in 11 (21.1%), and impacted in the ampullary area in 3 (5.7%). Operative procedures included cholecystectomy, operative cholangiography, and choledochostomy, as indicated. Of the 52 patients, 8 exhibited postoperative complications which included prolonged ileus, abdominal pain, persistently elevated serum amylase levels, wound infection, recurrent or mild pancreatitis, atelectasis, and delayed recovery. All of the patients were examined annually for the 1st 3 yr, and biannually thereafter. In the 1-15 yr postoperative follow-up, 8 of the patients died from causes unrelated to biliary-pancreatic disease. In 2 patients (4%), pancreatitis recurred: 1 related to choledocholithiasis 2 yrs after surgery, and 6 yr after operation with no apparent relation to biliary tract disease. Since the natural history of gallstone pancreatitis is one of frequent recurrence, the correction of the biliary tract disease should be performed on the initial hospital admission since deferring surgery puts the patient in jeopardy by allowing time for recurrent attacks of pancreatitis.

5635 PROGNOSTIC SIGNS AND THE ROLE OF OPERATIVE MANAGEMENT IN ACUTE PANCREATITIS. *(E.)* Ranson, J. H. C.; Rifkind, K. M.; Roses, D. F.; Fink, S. D.; Eng, K.; Spencer, F. C. (New York Univ. Med. Ctr., N.Y.). *Surg. Gynecol. Obstet.* 139(1):69-81, 1974.

To assess methods for the early identification of severe acute pancreatitis and evaluate the role early surgery, a 1 yr study was made of 100 atients with this condition. Pancreatitis was ssociated with alcoholism in 74, biliary tract isease in 14, and other causes in 12 patients. Fifeen patients died and 16 were seriously ill. Such eath or serious illness was correlated with 10 dmission findings pertaining to age; fluid retention; nd blood level changes in glucose, calcium urea itrogen, and the enzymes LDH and SGOT, as well as terial O_2 tension, hematocrit, and white blood ell count. Relation of these factors to morbidity nd mortality revealed that 2 deaths and 9 cases of erious illness occurred out of 79 patients with fewer han 3 of the 10 signs present, while there were 13 eaths and 7 serious illness cases out of 21 patients aving 3 or more of these 10 factors. These early bjective findings indicate clearly the gravity of volving acute pancreatitis and may permit the election of patients for the evaluation of new orms of therapy. To evaluate the role of early urgery, 10 seriously ill patients were randomly ssigned either to nonoperative management or to peration consisting of cholecystostomy, gastrostomy, ejunostomy, and wide pancreatic drainage. No deaths ccurred in either group; however, in the surgical roup, complications were more severe and the length f hospitalization was longer. Therefore, early perative management was not deemed to be of benefit n this small group.

536 ENDOSCOPIC PANCREATOGRAPHY IN MANAGEMENT OF RELAPSING ACUTE PANCREATITIS. *(E.)* Cotton, . B.; Beales, J. S. M. (Middlesex Hosp., London, ngland). *Br. Med. J.* 1(5908):607-611, 1974.

ndoscopic retrograde cholangiopancreatography (ERCP) as attempted in 31 patients suffering from repeated ttacks of acute pancreatitis. Pancreatograms were btained from 25 patients. Twelve showed definite surgical lesions" (obstructions, strictures, or seudocysts). In at least 3 patients, failure to obain a pancreatogram was due to obstruction of the ancreatic duct close to the papilla. Two patients ith pseudocysts developed a mild relapse of panreatitis after the pancreatographic procedure. Surical intervention based on the X-ray findings seemed eneficial in the short follow-up period. ERCP can be f value in deciding when surgery is advisable for atients with relapsing acute pancreatitis and in deermining the operative approach. This procedure eems to be the only way, short of surgery, to identiy a surgical lesion in the pancreatic duct. In some atients with parenchymal disease, ERCP may be the nly way of clearly showing the presence of gallstones. n cases of relapsing pancreatitis, particularly in hose with pseudocysts, no attempt should be made to utline the entire cyst, and the patient should be conidered for surgery within the next few days. ERCP hould always be an inpatient procedure.

637 THE EFFECT OF ISUPREL ON EXPERIMENTALLY-INDUCED PANCREATITIS IN THE DOG. *(E.)* avarro, L.; Wilk, P.; Rudick, J.; Drieling, D. A. Mt. Sinai Sch. of Med., City Univ. New York). *m. J. Gastroenterol.* 61(5):387-389, 1974.

The effect of Isuprel, a chronotropic drug, on survival time and on the extent of pancreatic lesions was studied in 23 mongrel dogs with experimentally produced pancreatitis. In 14 dogs, the Pfeffer method, i.e. a closed duodenal loop and gastroenterostomy, was used while in 7 animals, pancreatitis was produced by ligating the accessory pancreatic duct and injecting into the main duct a mixture of trypsin, blood, and bile. In both groups, approximately half the dogs were given i.v. Isuprel (1 μg/kg/min) via catheter in the vena cava. In the Pfeffer group, no significant differences were observed in either amylase level or pancreatic histology findings between the 6 dogs treated with Isuprel and the 8 controls; the survival time was 24 hours in all dogs. The gross anatomical findings consisted of a huge dilated, necrotic duodenal loop with a hemorrhagic pancreatitis involving the entire pancreas. In the second group, all 7 dogs were maintained under light anesthesia; 2 control and 2 Isuprel-treated dogs were sacrificed at 6 hours. The remaining animals were observed until they expired. These dogs died between 13 and 20 hours. A decrease in serum amylase levels were observed in both Isuprel-treated and control dogs over the course of the experiment. Portal pressures did not rise in the Ispurel-treated dogs, and they showed marked tachycardia. The decrease in serum amylase levels in the second group can be explained by the destruction of pancreatic tissue due to the sudden and acute hemorrhagic pancreatitis. It is concluded that the Isuprel did not reduce the volume and enzyme content of pancreatic secretion nor did it alter the pancreatic histology, mortality, or survival time. However, Isuprel did inhibit the increase in portal venous pressure following the injection of trypsin, blood and bile into the pancreas.

5638 FULMINATING PANCREATITIS IN PROLONGED PARENTERAL HYPERALIMENTATION: ONE CASE REPORT. *(Por.)* Faintuch, J.; Machado, M. C. C.; Birolini, D.; Lopes, L. H. C. (Fac. Med., Univ. Sao Paulo, Brazil). *Arq. Gastroenterol.* 11(2):91-94, 1974.

A severely malnourished 38-yr-old woman with dysphagia, frequent vomiting, heartburn, diarrhea, and radiological evidence of megaesophagus was fed totally i.v. after she had failed to respond to feeding through a gastrostomy tube and esophageal dilatation. Treatment was initiated by administering 1000 calories and 36 g amino acids daily, and plans were made to increase the total calories to 3000/day. However, after 4 days the patient developed mental confusion as a result of acidosis and hypovolemic shock; she displayed no concomitant abdominal symptoms. Despite efforts to treat circulatory disturbances and the use of artificial ventilation, her condition deteriorated and she died in less than 12 hr. Autopsy findings included acute necrotizing hemorrhagic pancreatitis, gallbladder dilation with no evidence of calculi, hydropic hepatocytic degeneration with remnants of *Schistosoma mansoni* ova, advanced megaesophagus, and severe hypertrophy of the tunica muscularis. Since there were no known factors which might have predisposed the patient to develop acute pancreatitis, it is suggested that an imbalance in amino acid metabolism might have been responsible for this complication, particularly since the patient was severely malnourished.

5639 FREE PROTEOLYTIC ENZYMES IN PANCREATIC JUICE OF PATIENTS WITH ACUTE PANCREATITIS. *(E.)* Geokas, M. C.; Rinderknecht, H. (VA Hosp., Sepulveda, Calif.). *Am. J. Dig. Dis.* 19(7):591-598, 1974.

To evaluate the postulation that inappropriate activation of zymogens in the pancreas plays an important role in the pathogenesis of acute pancreatitis, pancreatic juice from 4 patients with this disease was collected at 4 C from uncomplicated fistulae or by catheterization of the pancreatic duct and then was analyzed for concentrations of free trypsin, chymotrypsin, and elastase as well as the corresponding zymogens in the specimens. All samples contained free enzymes exclusively with the exception of the juice from 1 patient with a fistula who secreted zymogens and free chymotrypsin only during the first 2 postoperative days. The apparent lack of pancreatic trypsin inhibitor in the secretions of these patients, and earlier reports of low levels or absence of this inhibitor after abdominal operations, seems to point out a prerequisite in the development of acute pancreatitis. The trigger mechanism in the premature activation of pancreatic zymogens may be provided by autoactivation of trypsinogen or its activation by enzymes of the blood-clotting or fibrinolytic systems. Some evidence in support of such a hypothesis is presented.

5640 EXPERIMENTAL PANCREATITIS TREATED WITH GLUCAGON OR LACTATED RINGER SOLUTION. *(E.)* Condon, R. E.; Woods, J. H.; Poulin, T. L.; Wagner, W. G.; Pissiotis, C. A. (Med. Coll. Wisconsin, Milwaukee). *Arch. Surg.* 109(2):154-158, 1974.

One hundred twenty dogs were allocated randomly to five models of experimental pancreatitis and further assorted randomly within each model to four treatment groups. Pancreatitis models included the obstructed duodenal loop preparation and pancreatic duct injections of lactated Ringer solution or bile-trypsin solution at low or high pressures. Treatment groups were untreated controls; fluid-resuscitated animals; glucagon-treated animals; and animals that received both glucagon and fluids. Survival was recorded exactly up to 72 hours, at which time survivors were killed. Autopsy examinations recorded both gross and microscopic alterations in pancreatic structure. Glucagon treatment alone or in combination with volume resuscitation was not more efficacious than simple volume resuscitation in treatment of pancreatitis. In mild to moderate pancreatitis, glucagon therapy was associated with pancreatic hemorrhage not seen in either fluid-resuscitated or untreated control animals.

5641 BIOPSY OF THE PANCREAS. *(E.)* Isaacson, R. Weiland, L. H.; McIlrath, D. C. (Mayo Clin. Fdn., Rochester, Minn.). *Arch. Surg.* 109(2):227-230, 1974.

Biopsy of the pancreas for diagnosis of benign or malignant disease was performed in 527 patients during a ten-year period. The incidence of complication in patients who underwent laparotomy and biopsy of the pancreas was 6.2%. The incidence of complication presumed to be due to biopsy in patients who also underwent major pancreatic or biliary tract operations was 4.1%. Diagnosis made by microscopic examination of fresh-frozen sections correlated with subsequent review of permanent sections in all but one of the 527 cases. The results indicate that biopsy of the pancreas by wedge or needle technique and examination of fresh-frozen sections provide a reasonably safe and reliable way of establishing the diagnosis of pancreatic disease.

5642 CHRONIC PANCREATIC ASCITES. *(Fl.)* Haber, I.; de Leeuw, I. (Middelheim Gen. Hosp., Antwerp, Belgium). *Tijdschr. Gastroenterol.* 16(2):148-159, 1973.

5643 TREATMENT OF PANCREATITIS WITH GLUCAGON. *(Ger.)* Fleischer, K.; Kasper, H. (Med. Clin., Univ. Wurzburg, Germany). *Verh. Dtsch. Gesamte Inn. Med.* 79:870-873, 1973.

5644 HIGH ILEUS AND PANCREATITIS: AMYLASE AND THE TRIBUTYRIN-HYDROLYZING ENZYME SYSTEM. *(Ger.)* Lippert, H.; Nowak, W.; Reding, R.; Wiesner, M. (Surg. Clin. Polyclin., Ernst Moritz Arndt Univ., Greifswald, Germany). *Z. Gesamte Inn. Med.* 29(8):339-342, 1974.

5645 SPECIFICITY OF INCREASED RENAL CLEARANCE OF AMYLASE FOR ACUTE PANCREATITIS. *(E.)* Warshaw, A. L.; Fuller, Jr., A. F. (Massachusetts Gen. Hosp., Boston). *Gastroenterology* 66(4):869, 1974.

5646 A PROSPECTIVE SURVEY OF THE TREATMENT OF ACUTE PANCREATITIS. *(E.)* Imrie, C. W.; Whyte, A. S.; Blumgart, L. H. (no affil.). *Gut* 15(4):340-341, 1974.

5647 DIAGNOSIS AND TREATMENT OF PANCREATIC CYSTS. *(Rus.)* Trunin, M. A.; Dobychina, L. I. (Leningrad Med. Inst. Sanitation Hyg., USSR). *Vestn. Khir.* 111(11):18-22, 1973.

See also, 5366, 5373, 5376, 5386, 5407, 5631, 5730.

5648 LIVER DISEASE IN ASYMPTOMATIC CARRIERS OF HEPATITIS B ANTIGEN. *(E.)* Simon, J. B.; Patel, S. K. (Queen's Univ., Kingston, Ontario, Canada). *Gastroenterology* 66(5):1020-1028, 1974.

A 16 month prospective study of 6277 Red Cross blood donors in Canada was undertaken to determine the hepatic status of apparently healthy hepatitis B antigen (HB Ag) carriers. Out of 6277 donors, 12 (0.19%) HB Ag carriers were detected. Antigenemia was much more prevalent among prisoners (4 of 251, 1.6%) than among nonprisoners (8 of 6026, 0.13%). Of the 12 carriers, 2 who contracted acute viral hepatitis after blood donation recovered completely with resultant disappearance of antigenemia, and another carrier was lost to follow-up. In the remaining 9 chronic HB Ag carriers, neither symptoms nor signs of hepatic or other disease were evident. All were young adults who either abused drugs or had lived abroad where antigenemia is more prevalent than in North America. In 7 of the 9 carriers, liver function tests were moderately deranged. Liver biopsies from all 9 subjects were abnormal: 6 showed nonspecific focal or reactive hepatitis, one had lobular inflammation typical of acute viral hepatitis, and 2 revealed chronic aggressive hepatitis. Serial biopsies in a 10th asymptomatic HB Ag carrier who was not part of the above series showed transition from active lobular hepatitis to chronic persistent hepatitis during a 13 month period of study. Since this investigation showed that a wide spectrum of subclinical hepatic disease regularly accompanies the asymptomatic HB Ag carrier state in Canada, it is felt that further studies must be conducted to provide answers to clinically significant problems involving carrier blood donors.

5649 RAPID EVALUATION OF HEPATIC SIZE ON RADIOISOTOPE SCAN. *(E.)* Rosenfield, A. T.; Schneider, P. B. (Beth Israel Hosp., Boston, Mass.). *J. Nucl. Med.* 15(4):237-240, 1974.

Since hepatic enlargement is an index of liver disease, multiple single measurements of hepatic size were performed on 100 random liver scans from 67 patients (25-84 yr old, average 58) with abnormal livers studied over a period of 5 yr and from 33 normal liver control subjects (24-85 yr, average 69). Criteria used for normality (all had to be fulfilled) were normal SGOT, LAP and alkaline phosphatase levels; no tissue abnormality; and no focal abnormalities on scan. The best indicator of liver pathology was found to be a vertical measurement halfway between the xiphoid and right liver margin (i.e. between the right lateral liver edge and the midsternal line). An upper limit for normal can be chosen to provide an index of hepatic disease when exceeded. In this series, the upper limit was set at 15.5 cm, but this number may vary slightly with technique. Diagonal measurements, maximum vertical and horizontal measurements, and area calculations provided a less reliable upper limit in the series. The method outlined above provides a simple and accurate technique for radioisotope scan evaluations since it was proved empirically to be the most reliable index of liver pathology.

5650 HEPATIC DISORDERS ASSOCIATED WITH LIVER/KIDNEY MICROSOMAL ANTIBODIES. *(E.)* Smith, M. G. M.; Williams, R.; Walker, G.; Rizzetto, M.; Doniach, D. (King's Coll. Hosp. Med. Sch., London, England). *Br. Med. J.* 2(5910):80-84, 1974.

Recently a new autoantibody, liver/kidney microsomal antibody (LKM), has been recognized as a possibly useful marker in immunofluorescent tests for some liver diseases because LKM reacts mainly with hepatocytes and proximal renal tubules, with the antigen localized in microsomal membranes. LKM has been detected in 0.12% of all sera tested by the authors since December 1972. In this study, correlations were investigated between clinical conditions and the presence of LKM in the sera of 33 patients (16 male, 17 female). Although 7 of these patients had normal liver function tests, 26 of the 33 LKM-positive patients had clinical liver disease. These consisted of 15 with active chronic hepatitis, 7 with acute and 2 with subclinical hepatitis, and 2 with hepatocellular carcinoma. Most of the 33 patients had been retested for LKM periodically over 4 years, with persistently positive results. Sera were screened at 1:10 dilutions by indirect immunofluorescence with polyvalent anti-γ FITC conjugates. In view of the results here, LKM may make it possible to single out an active chronic hepatitis subgroup which differs from other groups. The most prominent features consist of a lower frequency of antinuclear antibody and smooth muscle antibody, a higher proportion of males, a relatively high incidence in children, and onset of the illness marked by jaundice.

5651 THE VARIABLE COURSE OF PRIMARY HEPATOCELLULAR CARCINOMA. *(E.)* Davidson, A. R.; Tomlinson, S.; Calne, R. Y.; Williams, R. (King's Coll. Hosp., London, England). *Br. J. Surg.* 61(5): 349-352, 1974.

A study was made of 85 patients (64 men and 21 women, aged 15-83 yr) with primary hepatocellular carcinoma. Abdominal pain, the commonest presenting symptom, had a mean duration of 18.2 months. Abdominal swelling due to hepatomegaly was another common presenting symptom present for several months and in one case 4 yr prior to diagnosis. Underlying liver diseases were present as follows: cryptogenic cirrhosis (21), alcoholic cirrhosis (14), hemochromatosis (12), active chronic hepatitis (2), primary biliary cirrhosis (1). In cirrhosis patients, the development of liver failure frequently led to the diagnosis of the complicating carcinoma. At diagnosis involvement of the lymph nodes in the porta hepatis or in the para-aortic regions was shown in 9 and metastases in more distant sites in 3 patients. In the 63 patients in whom the carcinoma was proven before autopsy, survival from time of diagnosis was 7.7 months. Of these 63, 26 received no specific therapy; their mean survival time was 3 months, with the exception of one 83-yr-old female with idiopathic hemochromatosis who survived 4 yr in good health. Of the remaining 37 patients, 14 underwent surgery; 13, cytotoxic therapy; and 10, radiotherapy with mean survival times of 14, 8.7, and 5.6 months, resp. Whether there was underlying cirrhosis made no significant difference to survival time as measured from time of diagnosis. Radioimmunoassay detected Australia antigen in the serum of 7 of 31 patients, only 1 of these not having underlying cirrhosis.

5652 IDENTIFICATION OF MONOHYDROXY BILE ACIDS IN INTRAHEPATIC CHOLESTASIS OF PREGNANCY.

(Ger.) Back, P.; Sjovall, K.; Sjovall, J. (Med. Clin., Univ. Freiburg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1626-1630, 1972.

Since i.v. administration of monohydroxy bile acids causes acute cholestasis in animals, determinations of these bile acids were made on plasma samples from patients with cholestatic jaundice of pregnancy and normal pregnant women. After preliminary purification, plasma bile acids were separated on a Sephadex LH 20 column into a conjugated fraction and a highly polar fraction containing sulfate esters of conjugated acids. Gas chromatography of these fractions showed that plasma from one patient contained conjugated 3β-hydroxy-5-cholenic acid instead of cholic, chenodeoxycholic, and deoxycholic acids found in the other plasma samples. Solvolysis of the sulfate ester fraction, followed by alkaline hydrolysis, revealed that lithocholic, 3β-hydroxy-5-cholenic, and ursodeoxycholic acids were present in patients' plasma and lithocholic acid was also present in normal controls. These results were confirmed by mass spectrometry of the methyl ester-trimethylsilyl ether derivatives. Cholic, chenodeoxycholic, and deoxycholic acids were identified in all plasma samples. Thus, monohydroxy bile acids and ursodeoxycholic acid are present in human plasma as sulfate esters of their conjugates. Further research is necessary to determine whether the presence of these acids is the cause or result of cholestatic jaundice of pregnancy.

5653 ANGIOSARCOMA OF THE LIVER IN A VINYL-CHLORIDE WORKER.

(E.) Lee, F. I.; Harry, D. S. (Victoria Hosp., Blackpool, England). *Lancet* 1(7870):1316-1318, 1974.

Massive edema, moderate ascites, and palpable liver, revealed upon examination of a 71 yr old man employed as a process worker for 20 yr in the manufacture of polyvinyl chloride from vinyl chloride monomer, suggested cirrhosis following further investigation. After his sudden death 2 weeks later, necropsy showed malignant hemangio-endothelioma (angiosarcoma) of the liver, an extremely rare tumor. In the 19 previously reported cases of this condition among workers in polyvinyl chloride plants, most had worked in that field for periods of 12-27 yr. Some of the reports stressed the concept of a multisystem involvement. The evidence appears strong that angiosarcoma of the liver is an occupational tumor and that vinyl chloride is the carcinogen. However, there is no evidence that the finished polymer, polyvinyl chloride, carries any risk. It may be that there is considerable individual variation in susceptibility to the hepatic effects of vinyl chloride; work in rats suggests that this sensitivity may be related to enhanced microsomal enzyme activity. Presently, many different avenues of research as well as investigation of records are being pursued to determine the scope of vinyl chloride effects.

5654 LIVER ULTRASTRUCTURAL FINDINGS IN PATIENTS INJECTED WITH THOROTRAST.

(E.) da Silva Horta, J.; Cristina, M. L.; Baptista, A. S. (Fac. Med., Lisbon, Portugal). *Proc. Int. Meeting Toxicity Thorotrast, 3rd, Copenhagen, Denmark, 1973* pp. 219-232.

Liver biopsies from 6 patients injected with Thorotrast (25-40 yr ago) were examined by electron microscopy. Alterations of the mitochondria (e.g. sizes up to 5 x 1.2 μ); smooth and rough endoplasmic reticulum; bile canaliculi (lumen distension); and hypertrophic Golgi complexes were found. Numerous multivesicular bodies were present. Thorotrast aggregates were found in the Kupffer and histiocytic cells, accompanied by needle like structures and surrounded by dense collagen, but Thorotrast was seldom seen in the hepatocyte. These findings were identical in all the cases and were more intense in patients injected the longest time ago. Although the lesions are not specific, it is suggested that they may represent an adaptive reaction to Thorotrast.

5655 CHARCOAL HAEMOPERFUSION IN THE TREATMENT OF FULMINANT HEPATIC FAILURE.

(E.) Gazzard, B. G.; Weston, M. J.; Murray-Lyon, I. M.; Flax, H.; Record, C. O.; Portman, B. N.; Langley, P. G.; Dunlop, E. H.; Mellon, P. J.; Ward, B.; Williams, R. (King's Coll, Hosp., London, England). *Lancet* 1(7870):1301-1307, 1974.

Twenty-two patients (aged 15-63 yr) with fulminant hepatic failure who deteriorated to grade-IV coma despite full supportive therapy were treated by repeated periods of hemoperfusion through columns containing activated charcoal. The procedure was well tolerated clinically. Eleven patients regained consciousness and 10 left the hospital. Follow-up liver biopsies in the first 3 patients at around 6 months after discharge showed restitution of the normal lobular architecture. Of the 11 treatment failures, hemorrhage was responsible for death in 3; and in 6, brain herniation secondary to cerebral edema was an important contributory factor. The column extracted most amino acids from the plasma; and during perfusion, arterial concentrations of phenylalanine, tyrosine, and methionine (amino acids known to be involved in the pathogenesis of the encephalopathy) fell significantly. The charcoal was coated with a biocompatible polymer, and there was no evidence of removal of coagulation factors. The extraction of platelets was below 30% in most instances, and in only 2 patients was there evidence that bleeding may have been precipitated by the hemoperfusion. These survival figures are in contrast to a previous survival rate of 10% in a series of 92 cases with fulminant hepatic failure and grade III or IV encephalopathy treated by full supportive meaures.

5656 PRIMARY LIVER TUMORS IN INFANCY AND CHILDHOOD: 41 CASES VARIOUSLY TREATED.

(E.)

Clatworthy, Jr., H. W.; Schiller, M.; Grosfeld, J. L. (Ohio State Univ. Coll. Med., Columbus). *Arch. Surg.* 109(2):143-147, 1974.

Forty-one infants and children (neonate to 17 yr, 20 girls and 21 boys) with primary tumors of the liver were evaluated as to cell type, age, sex, symptoms, diagnosis, therapy, and results. Malignant hepatomas were present in 26 (60%) of the patients, and there was one case of malignant teratoma and of mesenchymoma, while 13 lesions were histologically benign. Twenty-seven (66%) cases were diagnosed and treated under the age of 2 yr; 21 (51%) patients were in the 1st yr of life; and only 10 of the 41 patients were over 5 yr of age. No age difference was observed between those with benign and those with malignant lesions. Half of the patients were males, and most of the children were admitted with an asymptomatic abdominal mass. Tumor localization was accomplished by conventional roentgenographic and scanning techniques. Diagnosis was established at autopsy for 3 patients, and 38 underwent exploratory operation. Tumor resections were completed in 22 cases with 3 operative deaths. All patients with benign tumors and 3 of the 9 (33 1/3%) hepatoma patients have remained well five or more years. In the future, additional success may be foreseen by combining radiation, chemotherapy, and second-look resections.

5657 HEPATOMA, ERYTHROCYTOSIS AND INCREASED SERUM ERYTHROPOIETIN DEVELOPING IN LONG-STANDING HEMOCHROMATOSIS. *(E.)* Scott, D.; Theologides, A. (Univ. Minnesota Med. Sch., Minneapolis). *Am. J. Gastroenterol.* 61(3):206-211, 1974.

5658 ELECTIVE HEPATIC SURGERY. *(E.)* Longmire, Jr., W. P.; Trout, III, H. H.; Greenfield, J.; Tompkins, R. K. (UCLA Sch. Med., Los Angeles, Calif.). *Ann. Surg.* 179(5):712-721, 1974.

5659 SURVIVAL AFTER HEPATIC ARTERY LIGATION: PRESENT CONTROVERSY AND RATIONALE OF MANAGEMENT, WITH A CASE REPORT. *(E.)* Baker, Jr., J. W.; Chan, A. P.; Anderson, F. H. (Dept. Surg., Univ. British Columbia, Vancouver, Canada). *Can. J. Surg.* 17(3):135-141, 1974.

5660 CAROLI'S DISEASE ASSOCIATED WITH CONGENITAL HEPATIC FIBROSIS AND RENAL TUBULAR ECTASIA: A CASE REPORT. *(E.)* Mall, J. C.; Ghahremani, G. G.; Boyer, J. L. (Pritzker Sch. Med., Univ. Chicago, Ill.). *Gastroenterology* 66(5):1029-1035, 1974.

5661 URINARY D-GLUCARIC ACID EXCRETION IN NORMAL AND G-6-PD-DEFICIENT CHILDREN WITH FAVISM. *(E.)* Cassimos, C.; Malaka-Zafiriu, K.; Tsiures, J. (Ahepa Hosp., Thessaloniki, Greece). *J. Pediatr.* 84(6):871-872, 1974.

5662 Staphylococcus epidermidis AS A CAUSE OF LIVER ABSCESS: CASE REPORT. *(E.)* Miller, T. E. (Auckland Hosp., New Zealand). *N.Z. Med. J.* 79(509):692-693, 1974.

5663 POSTOPERATIVE JAUNDICE. *(E.)* LaMont, J. T. (Massachusetts Gen. Hosp., Boston). *Surg. Clin. North Am.* 54(3):637-645, 1974.

5664 SERUM ALPHAFETOPROTEIN LEVEL IN PATIENTS WITH TUMORAL AND NON-NEOPLASTIC LIVER DISEASES. *(E.)* Chayvialle, J. A. P.; Touillon, C.; Lambert, R. (E. Herriot Hosp., Lyon, France). *Gastroenterology* 66(4):673, 1974.

5665 SERUM AND LIVER TRIGLYCERIDES IN MALNOURISHED JAMAICAN CHILDREN WITH FATTY LIVER. *(E.)* Flores, H.; Seakins, A.; Brooke, O. G.; Waterlow, J. C. (Dept. Nutrition Food Technology, Univ. Chile, Santiago). *Am. J. Clin. Nutr.* 27(6):610-614, 1974.

5666 ELASTOGENESIS IN THE LIVER. *(E.)* Shikata, T.; Sakai, S. (Fac. Med., Univ. Tokyo, Japan). *Acta Pathol. Jap.* 24(1):21-31, 1974.

5667 AN AUTOPSY CASE OF MALIGNANT HEMANGIOENDOTHELIOMA OF THE LIVER. *(E.)* Tanimura, A.; Tanaka, T.; Yamamoto, H.; Nakashima, T.; Hamada, M.; Tsuzi, Y.; Kaku, H. (Kurume Univ. Sch. Med., Japan). *Acta Pathol. Jap.* 24(1):131-139, 1974.

5668 PLASMA COLLAGEN-LIKE PROTEINS (CLP) AND GLYCOSAMINOGLYCURONANS (GAG). *(E.)* Galambos, J. T. (Emory Univ. Sch. Med., Atlanta, Ga.). *Gastroenterology* 66(4):840, 1974.

5669 LIVER INJURY IN PROTEIN-CALORIE MALNUTRITION: AN ELECTRON MICROSCOPIC STUDY. *(E.)* Tandon, B. N.; Ramanujan, R. A.; Tandon, H. D.; Puri, B. K.; Gandhi, P. C. (All India Inst. Med. Sci., New Delhi). *Am. J. Clin Nutr.* 27(6):550-558, 1974.

5670 MANAGEMENT OF LIVER TRAUMA IN 811 CONSECUTIVE PATIENTS. *(E.)* Trunkey, D. D.; Shires, G. T.; McClelland, R. (Univ. Texas, Southwestern Med. Ctr., Dallas). *Ann. Surg.* 179(5):722-728, 1974.

5671 PLASMA AMINO ACIDS IN DOGS WITH TWO EXPERIMENTAL FORMS OF LIVER DAMAGE. *(E.)* Aguirre, A.; Yoshimura, N.; Westman, T.; Fischer, J. E. (Massachusetts Gen. Hosp., Boston). *J. Surg. Res.* 16(4):339-345, 1974.

See also, 5136, 5297, 5369, 5371, 5383, 5384, 5385, 5393, 5398, 5400, 5401, 5403, 5411, 5419, 5552, 5680, 5713.

Acute Viral Hepatitis

5672 AN OUTBREAK OF CHIMPANZEE ASSOCIATED HEPATITIS.

(E.) Hinthorn, D. R.; Foster, M. T.; Bruce, H. L.; Aach, R. D. (Univ. Kansas Med. Ctr., Kansas City). *J. Occup. Med.* 16(6):388-391, 1974.

The recently recognized association of primate-related hepatitis in humans led to investigation of an outbreak of acute hepatitis in 14 animal handlers at a municipal zoo. Two of the attendants acquiring hepatitis, however, had no contact with primates but were responsible for disposing of animal excreta from that area. Traced to 2 recently imported young chimpanzees, this epidemic was the first in which acute phase sera were screened for hepatitis B antigen (HB Ag) and its antibodies (anti-HB Ag) by using a radioimmunoassay technique. HB Ag was not demonstrated in the serum from the chimpanzees, the patients with hepatitis, or other attendants at risk. With serial serum testing, anti-HB Ag of low titer was found in the serum of only 1 of the 14 patients, an incidence similar to that in the community around the zoo. Epidemiologically, the outbreak had characteristics of short-incubation or type A viral hepatitis. Other examinations performed were SGOT, LDH, total bilirubin, and liver biopsies. At this stage, no distinction may be made between the spread of typical short-incubation hepatitis from chimp to man and the transmission to man of a different infectious agent primarily affecting subhuman primates. Findings here indicate that immunologically distinct infectious agents are capable of producing hepatitis in human and subhuman primates. The observation on the 2 hepatitis patients who handled only excreta argues strongly for fecal-oral transmission from chimpanzees to humans. Routine screening of newly-arrived primates for elevated SGOT might prove valuable in detecting animals capable of transmitting hepatitis to attendants.

5673 SUBSPECIFICITIES OF AUSTRALIA ANTIGEN.

(E.) Sama, S. K.; Krishnamurthy, L.; Gurdeep, S. (All-India Inst. Med. Sci., New Delhi). *Am. J. Dig. Dis.* 19(6):533-536, 1974.

The objective of this study was to determine the association, if any, between subtypes *ad* and *ay* of Australia antigen and the clinical outcome of infection (carrier state, acute hepatitis, or chronic hepatitis). Over a period of 2 yr, agar-gel diffusion and counterelectrophoresis techniques were used to identify subtypes *a*, *y* and *d* in 100 samples of HB Ag-positive serum from 76 cases of virus B hepatitis and 24 carriers. All sera were positive for the *a* determinant. Of the total, 67 samples were positive for the *y* determinant (and therefore for *ay*) and 33 for the *d* determinant (and thus for *ad*). Similar relative distribution of subtypes was found in cases of hepatitis and carriers. However, on evaluating the hepatitis group alone, a significant predominance of subtype *ay* was found in cases of acute hepatitis (41/48) and subtype *ad* (18/28) in cases of chronic hepatitis. This implies that infection with hepatitis B virus of subtype *ad* is more likely to lead to the sequelae of chronic hepatitis than infection with subtype *ay*.

5674 A PROSPECTIVE STUDY INDICATING THAT DOUBLE-ANTIBODY RADIOIMMUNOASSAY REDUCES THE INCIDENCE OF POST-TRANSFUSION HEPATITIS B.

(E.) Hollinger, F. B.; Werch, J.; Melnick, J. L. (Baylor Coll. Med., Houston, Tex.). *N. Engl. J. Med.* 290(20):1104-1109, 1974.

The efficacy of the double-antibody radioimmunoassay method (RIA-DA) in screening donor blood for the hepatitis B antigen (HB_s Ag, the antigen of the small 20-nm particle, which is also present on the surface of the large Dane particle) was compared with that of the Ausria solid-phase system using 227 recipients of blood transfusions. Of the 688 counterelectrophoresis-negative donor units tested, RIA-DA showed 2.6% to be positive for HB_s Ag, while the Ausria method showed only 1.5% to be positive. Approximately 70% of the 227 recipients were negative for HB_s Ag and antibody. Eight of these susceptible recipients received an RIA-DA positive unit of blood without receiving any anti-HB_s-positive donor units. In 7 of these patients, clinical hepatitis B subsequently developed or there was serologic evidence of exposure to hepatitis B virus. No anicteric or icteric cases of HB occurred among the 147 susceptible individuals who received RIA-DA negative blood. The Ausria method failed to implicate a positive donor in the cases of 3 susceptible patients who developed serologic evidence of exposure to hepatitis B virus or in the cases of two susceptible patients who developed clinical hepatitis B. The RIA-DA test is apparently the most reliable technique currently available for measuring HB_s Ag levels.

5675 ELECTRON MICROSCOPY AND IMMUNOELECTRON-MICROSCOPY OF CYTOPLASMIC HEPATITIS B ANTIGEN IN HEPATOCYTES.

(E.) Gerber, M. A.; Hadziyannis, S.; Vissoulis, C.; Schaffner, F.; Paronetto, F.; Popper, H. (VA Hosp., Bronx, N.Y.) *Am. J. Pathol.* 75(3):489-502, 1974.

Studies to determine hepatitis B antigen localization and the nature of the virus-like particles in hepatocytes of HB antigenemic patients were made by immunofluorescent and electron microscopic examinations of 29 liver biopsy and 4 autopsy specimens. Sources were 16 hepatitis B antigen carriers, 2 hepatitis B antigen seropositive patients with acute and 9 with chronic hepatitis, and 6 hepatitis B antigen seronegative persons. A varying number of hepatocytes showed numerous tublar and circular structures (20 to 30 nm diameter) in the cisternae of the excess smooth endoplasmic reticulum, and fluorescence which was cytoplasmic hepatitis B antigen-specific was seen. Such hepatocytes were found in 13 of 16 hepatitis B antigen carriers and in 4 of 9 patients with hepatitis B antigen-positive chronic hepatitis. Direct immunoelectronmicroscopy using peroxidase-labeled hepatitis B antigen antibody revealed that the intracisternal bodies and the surrounding membranes contained hepatitis B antigenic determinants. These bodies were an ultrastructural correlate of cytoplasmic hepatitis B antigen. It is suggested that they are virally coded coat material rather than the mature hepatitis B virus or its core. Immunoelectronmicroscopy using antibodies specific for the core and the coat of hepatitis B virus should demonstrate whether this suggestion is correct.

5676 HEPATOCELLULAR ULTRASTRUCTURE IN ASYMPTOMATIC HEPATITIS B ANTIGENEMIA. *(E.)* Sun, S. C.; Anderson, K. E.; Hsu, C. P.; Kau, S. L. (US Naval Med. Res. Unit No. 2, Taipei, Taiwan). *Arch. Pathol.* 97(6):373-379, 1974.

Liver biopsy samples from 21 Chinese military recruits from Taiwan (20-21 years old) with hepatitis B (HB) antigenemia were examined to determine histologic and cytologic abnormalities. The only common laboratory findings were mild elevation of SGOT and retention of BSP. Follow-up studies showed persistent HB antigenemia from 1.5 to 22 months. Light microscopic examination revealed 1 normal specimen, and changes associated with chronic persistent hepatitis in 3 cases, lobular hepatitis (9), and milder and less specific lobular abnormalities (8). In 9 cases, hepatocyte swelling was seen with ground-glass cytoplasm. There was no apparent correlation between the severity of the above histopathologic changes and the following changes observed by electron microscopy. Fine structural abnormalities were frequently present in the endoplasmic reticulum, mitochondria (swelling), and bile canaliculi (dilated with reduced or absent microvilli at the lumen surface). Nuclear changes were not prominent, and no intranuclear virus-like particles were found. Most striking was a pattern of proliferation of the endoplasmic reticulum associated with intracisternal filaments and particles which possibly represent an intracytoplasmic form of HB virus within the cisternae. The relation of this cytoplasmic alteration to HB virus replication deserves further study.

5677 VIRAL HEPATITIS, TYPE B. DNA POLYMERASE ACTIVITY AND ANTIBODY TO HEPATITIS B CORE ANTIGEN. *(E.)* Krugman, S.; Hoofnagle, J. H.; Gerety, R. J.; Kaplan, P. M.; Gerin, J. L. (New York Univ. Med. Ctr., N.Y.). *N. Engl. J. Med.* 290(24):1331-1335, 1974.

The results of studies of DNA polymerase activity and antibody to hepatitis B core antigen (HB$_c$ Ag) in serial serum specimens from immunized and unimmunized persons are presented here. These findings are correlated with the results of tests for SGOT activity, hepatitis B surface antigen (HB$_s$ Ag), formerly called Australia, and its antibody. The subjects were exposed to the MS-2 strain (or combined MS-1 and MS-2 strains) of hepatitis virus, parenterally, orally, and by contact exposure to hepatitis patients. Subsequent hepatitis B infection after parenteral exposure to MS-2 serum was detected by the appearance of hepatitis B surface antigen, which was identified as early as the 14th day by radioimmunoassay, on the 20th day by reversed passive hemagglutination, and on the 27th day by complement fixation. DNA polymerase activity was observed on the 41st day, and abnormal SGOT activity on the 59th day. The first antibody detectable was anti-hepatitis B core on day 59, followed by anti-hepatitis B surface, which was not detectable on day 146 but was present on day 203. DNA polymerase activity was detectable for at least 5 days but less than 2 weeks. In a patient who acquired hepatitis by contact, the hepatitis B surface antigen was first detected about 3 months after exposure, persisting for approximately 4 months. DNA polymerase activity, abnormal SGOT values and anti-hepatitis B core all became detectable 4.5 months after exposure. After oral exposure to combined MS-1 and MS-2 serum pool, there were abnormal SGOT levels from day 30 to 41, indicative of hepatitis A virus infection. Hepatitis B surface antigen was detected on day 75, 3 weeks before the SGOT levels again became abnormal on day 97. DNA polymerase activity was not detected. An oral exposure to the combined MS-1 and MS-2 serum pool, followed 6 months later by a parenteral exposure to the same serum pool, resulted in early evidence of hepatitis A infection. After parenteral exposure, there was detectable hepatitis B surface antigen 31 days later, detectable DNA polymerase activity on day 56, abnormal SGOT levels on day 70, and detectable anti-hepatitis B core on day 75. In a patient with hepatitis B virus infection and a subsequent chronic carrier state, hepatitis B surface antigen was detected on day 20 and persisted thereafter. DNA polymerase activity appeared transiently 1 to 2 months after exposure. Serial observations for 2 years after prevention of viral hepatitis, type B, with specific immune serum globulin revealed normal SGOT values, no detectable DNA polymerase activity, and no detectable hepatitis B small antigen. Three inoculations of heat-inactivated MS-2 serum at 2-month intervals were followed 4 months later by an inoculation of unheated MS-2 serum. During the 1.75-year follow-up period, SGOT values were normal, and DNA polymerase activity, hepatitis B surface antigen, and anti-hepatitis B core were not detectable. These findings indicate that DNA polymerase apparently can identify the period of peak hepatitis B virus replication.

5678 ANTIBODY TO HEPATITIS B CORE ANTIGEN. A SENSITIVE INDICATOR OF HEPATITIS B VIRUS REPLICATION. *(E.)* Hoofnagle, J. H.; Gerety, R. J.; Ni, L. Y.; Barker, L. F. (Bureau Biologics, Food Drug Admin., Bethesda, Md.). *N. Engl. J. Med.* 290(24):1336-1340, 1974.

Several populations were studied for the presence of hepatitis B surface antigen, its antibody, and the hepatitis B core antibody. Of 200 volunteer blood donors negative for hepatitis B surface antigen by either counterelectrophoresis or radioimmunoassay, 8 (4%) were positive for the surface antibody by passive hemagglutination and 2 (1%) were positive for hepatitis B core antibody. Of 363 hepatitis B surface antigen-positive samples obtained from apparently healthy persons, 307 were positive for the antigen by counterelectrophoresis and the remaining 56 were positive by radioimmunoassay. In the entire group, 355 (98%) were positive for hepatitis B core antibody. Among 100 chronic human carriers, 96 were positive for hepatitis B antigen by counterelectrophoresis and the remaining 4 were positive by radioimmunoassay. All 100 chronic carrier serum samples were positive for hepatitis B core antibody. Among 30 serum samples yielding false-positive reactions on radioimmunoassay, 1 was positive for both core antibody and surface antibody, and 1 was positive for surface antibody alone. A total of 10 of 16 blood donors implicated in post-transfusion hepatitis were positive for core antibody, including 4 who were positive for core antibody alone and negative for both surface antigen and surface antibody. The remaining 6 implicated donors were negative by all 3 tests. It is concluded that a test for antibody to hepatitis B core antigen may be a sensitive indicator of persistent viral replication even when subdetectable amounts of hepatitis B surface antigen are circulated.

5679 PARAPROTEINS WITH ANTIBODY ACTIVITY IN ACUTE VIRAL HEPATITIS AND CHRONIC AUTOIMMUNE LIVER DISEASES. *(E.)* Roux, M. E. B.; Florin-Christensen, A.; Arana, R. M.; Doniach, D. (Med. Educ. Ctr., Invest. Clin., Buenos Aires, Argentina). *Gut* 15(5): 396-400, 1974.

Of 27 patients with liver disease and cryoglobulinemia, 18 proved to have paraproteins. Six of these monoclonal immunoglobulins were shown to have antibody activity, directed to human gamma globulin, alpha$_1$-fetoprotein, smooth muscle, and mitochondria. Eight of the patients suffered from acute viral hepatitis, 5 of whom were HB Ag positive; in all these cases the monoclonal spikes were transient and their antibody activities were directed against IgG in 2 cases and alpha$_1$-fetoprotein in 1. Seven of the patients had active chronic hepatitis and in these the paraproteinemia persisted, though remaining quantitatively unchanged over several years. One of them had a cryoprecipitable monoclonal smooth muscle antibody. Three patients had primary biliary cirrhosis and in 2 of them monoclonal IgM mitochondrial antibodies were demonstrated. In three out of the 18 cases there was a double M-component. Since these monoclonal antibodies are directed to autoantigens not unlike the polyclonal ones usually seen in autoimmune hepatic diseases, it is suggested that the factor which triggers the uncontrolled plasma cell proliferation to produce paraproteins must contact cells from an already expanding clone.

5680 CELL-MEDIATED IMMUNE RESPONSE TO HEPATITIS B ANTIGEN IN PATIENTS WITH LIVER DISEASE. *(E.)* Gerber, M. J.; Phuangsab, A.; Vittal, S. B. V.; Dourdourekas, D.; Steigmann, F.; Clowdus, B. F. (Univ. Hlth. Sci./Chicago Med. Sch., Ill.). *Am. J. Dig. Dis.* 19(7):637-643, 1974.

Cell-mediated immune response to both serum and purified hepatitis B antigen (HB Ag) was measured in 151 subjects (including 14 controls) using the leukocyte migration inhibition test. Ninety-five percent of patients with HB Ag-positive acute viral hepatitis and 64% of patients with HB Ag-negative had positive leucocyte migration inhibition tests. Positive tests were rarely present in asymptomatic HB Ag carriers and were not found in patients with alcoholic liver disease or in normal controls. The data suggest that many patients with acute viral hepatitis in whom HB Ag is undetectable may have hepatitis B and that measurement of *in vitro* leucocyte migration inhibition to HB Ag is a sensitive index for establishing the etiological role of the antigen in the liver disease.

5681 LIVER DISEASE IN ASYMPTOMATIC HEPATITIS-B ANTIGEN CARRIERS. *(E.)* Schaefer, R. A.; Finlayson, N. D. C.; Prince, A. M. (no affil.). *J. Clin. Invest.* 53(6):71a, 1974.

5682 TREATMENT OF FULMINANT TYPE B HEPATITIS WITH HEPATITIS B IMMUNE GLOBULIN: A COOPERATIVE STUDY. *(E.)* Anonymous. *Gastroenterology* 66(4):752, 1974.

5683 THE INCIDENCE OF ACUTE AND CHRONIC HEPATITIS AMONG MEMBERS OF MEDICAL PROFESSIONS. *(Ger.)* Kownatzki, E. (Med. Clin., Univ. Freiburg, Germany). *Med. Klin.* 64(46):1511-1514, 1973.

5684 POST-TRANFSUION HEPATITIS: VALUE OF HEPATITIS B ANTIGEN (HB Ag) SCREENING WITH RADIOIMMUNOASSAY (RIA) IN A VOLUNTEER DONOR POPULATION. *(E.)* Lander, J. J.; Aach, R. D. (Washington Univ. Sch. Med., St. Louis, Mo.). *Gastroenterology* 66 (4):728, 1974.

5685 MATERNAL TRANSMISSION OF HEPATITIS. *(E.)* Zuckerman, A. J. (no affil.). *Nature* 249(5453):105-106, 1974.

5686 CLINICAL AND BIOCHEMICAL DIFFERENCES IN THE COURSE OF INFECTIOUS AND SERUM HEPATITIS. *(Ger.)* Strohm, W. D.; Hoy, U.; Stille, W. (Ctr. Internal Med., Univ. Frankfurt/Main, Germany). *Munch. Med. Wochenschr.* 116(20):1031-1036, 1974.

5687 AUSTRALIA (HEPATITIS-ASSOCIATED) ANTIGEN AND SPECIFIC ANTIVIRAL IMMUNITY IN CHILDREN WITH CHRONIC DISEASES. *(Rus.)* Lozovskaia, L. S.; Kasavina, M. A.; Nisevich, L. L.; Soboleva, V. D.; Shigina, O. M.; Chistova, L. V.; Iakovleva, A. A.; Krasnova, K. N. (Inst. Pediatr., Moscow, USSR). *Sov. Med.* 36(5):7-12, 1973.

5688 IMMUNOLOGICAL DISORDERS IN LIVER DISEASE. *(Rus.)* Minogina, N. A. (Ukrainian Inst. Postgrad. Med., Khar'kov, USSR). *Vrach. Delo* (5): 79-83, 1974.

5689 CLINICAL FEATURES AND TREATMENT OF VIRAL HEPATITIS. *(It.)* Coltorti, M.; del Vecchio-Blanco, C. (1st Fac. Med. Surg., Univ. Naples, Italy). *Ann. Sanita Pubblica* 34(1/2):19-90, 1973.

See also, 5124, 5650.

LIVER AND BILIARY TRACT

Chronic Hepatitis

5690 T AND B LYMPHOCYTES IN ACUTE AND CHRONIC HEPATITIS. *(E.)* DeHoratius, R. J.; Strickland, R. G.; Williams, Jr., R. C. (Univ. New Mexico, Sch. Med., Albuquerque). *Clin. Immunol. Immunopathol.* 2(3):353-360, 1974.

Peripheral blood thymus-dependent and bone marrow-dependent lymphocytes were measured in 50 healthy controls, in 40 hepatitis patients with or without hepatitis B antigen, and in 2 asymptomatic carriers of the antigen. A significant decrease in thymus-dependent lymphocytes occurred in patients with acute or chronic hepatitis but not in asymptomatic, hepatitis B antigen carriers. No significant difference was found between the proportion of liver thymus-dependent lymphocytes in antigen-positive patients and that in antigen-negative patients. The decrease occurred in all forms of acute hepatitis and was transient in patients who recovered. Thymus-dependent lymphocyte depression occurred in both chronic persistent and chronic aggressive hepatitis and did not correlate with disease activity or mode of treatment. In both acute and chronic hepatitis, decreases in thymus-dependent lymphocytes occurred independently of serum autoantibodies. The findings emphasize the potential importance of host responses in determining the outcome of viral hepatitis.

5691 ASSESSMENT OF ACTIVITY IN CHRONIC ACTIVE LIVER DISEASE: SERUM BILE ACIDS COMPARED WITH CONVENTIONAL TESTS AND HISTOLOGY. *(E.)* Korman, M. G.; Hofmann, A. F.; Summerskill, W. H. J. (Mayo Clin. Mayo Fdn., Rochester, Minn.). *N. Engl. J. Med.* 290(25):1399-1402, 1974.

Serum conjugates of cholic acid were determined by radioimmunoassay and compared with conventional tests in 38 patients (13-70 yr) during the course of chronic active liver disease that responded to treatment. There were 28 cases of chronic active hepatitis, 5 of subacute hepatitis with bridging, and 5 with multilobular necrosis. Therapy included placebo, prednisone, and prednisone and azathioprine. Sixteen patients subsequently relapsed when treatment was discontinued. At the time of diagnosis, values for these bile acids were always significantly elevated. With conventional liver tests, the values were still elevated in 33 of 38 patients, and this finding correlated with evidence of continuing histologic activity. At histologic remission of disease activity, these values were less than twice the upper limit of normal in all 22 patients who subsequently remained in remission without treatment, but were significantly higher in 9 of 16 who later relapsed. During relapse, serial determinations showed that elevation of serum conjugates of cholic acid preceded an increased SGOT. Findings indicate that serum concentrations of these bile acids in chronic active liver disease during and after therapy provide a more sensitive indication of active hepatitis than conventional liver tests.

5692 CHRONIC ACTIVE HEPATITIS WITHOUT HEPATITIS B ANTIGENEMIA IN RENAL TRANSPLANT RECIPIENTS. REPORT OF THREE CASES. *(E.)* Freiberger, Z.; Anuras, S.; Koff, R. S.; Bonney, W. W. (VA Hosp., Boston, Mass.). *Gastroenterology* 66(6):1187-1194, 1974.

Hepatic dysfunction is recognized as a complication in immunosuppressed patients after renal transplant, and progression of acute hepatitis B to hepatitis B antigen-positive chronic active hepatitis may occur. Over a 2 yr period, histologically confirmed chronic active hepatitis was observed in 3 patients 3 to 11 months after renal transplantation. None had circulating hepatitis B antigen in multiple serum samples tested by radioimmunoassay. Each patient had been treated with immunosuppressive therapy, consisting of prednisone and azathioprine, during the period in which liver disease became evident. Since a total of 32 patients underwent renal transplantation during the same period, this means approx. 10% developed clinically apparent chronic active hepatitis without hepatitis B antigenemia. Cyclophosphamide was substituted for azathioprine in all 3 patients, but no clear response to this alteration in therapy was observed, and in 1 patient, who developed hepatic failure, postnecrotic cirrhosis with esophagogastric varices was found on postmortem examination. The development of chronic active hepatitis without hepatitis B antigenemia after renal transplantation extends the spectrum of liver disease observed in immunosuppressed transplant recipients and raises new questions in the management of this hepatic disorder. The absence of antigenemia in the 3 patients reported here suggests that azathioprine, rather than hepatitis B infection, may possibly play a crucial role in the development of chronic active hepatitis.

5693 ACUTE SUBMASSIVE HEPATIC NECROSIS DUE TO METHYLDOPA: A CASE DEMONSTRATING POSSIBLE INITIATION OF CHRONIC LIVER DISEASE. *(E.)* Schweitzer, I. L.; Peters, R. L. (John Wesley County Hosp., Los Angeles, Calif.). *Gastroenterology* 66(6):1203-1211, 1974.

Acute submassive hepatic necrosis developed in a 49-yr-old woman with a 15 yr history of essential hypertension and a 4 yr history of diabetes mellitus.

Hypertension had first been treated with hydrochlorothiazide and then with reserpine, but 10 weeks before onset of symptoms, methyldopa (250 mg 3 times a day) had been substituted for reserpine. Other medications taken during the period immediately before onset of symptoms were diazepam (5 mg twice a day), indomethacin (25 mg as needed for back pain), and neutral protamine Hagedorn insulin injections for diabetes. The patient had received no blood transfusions in the past 2 yr. The reported adverse hepatic reactions to methyldopa administration include significant hepatic cell injury producing a syndrome with clinical, biochemical, and histopathological changes resembling acute viral hepatitis. The liver lesion was associated with a positive lupus erythematosus preparation, a positive direct Coombs test, and transient portal hypertension. Causal relation between methyldopa and the hepatic necrosis was established by an unequivocal response of transaminase activity to readministration of the drug. The most striking histological feature during the acute phase of the disease was extensive necrosis of liver cells in the periportal areas. The initial illness improved rapidly, and the patient has since remained asymptomatic. However, the following subsequent observations suggest that hepatic necrosis due to methyldopa may have initiated chronic liver disease: (1) the left lobe of the liver became persistently enlarged and firm after recovery from the acute liver injury; (2) liver scans 6 and 9 months after the acute episode revealed generalized mottling and a hypertrophied left lobe; (3) the liver tests did not return to normal for 9 months; and (4) follow-up liver biopsies revealed broadened periportal fibrosis at 6 months and collapsed stroma at 10 months after the acute submassive necrosis, although there was insignificant inflammatory activity at the time of the biopsy.

5694 THE PHARMACOKINETICS OF AZATHIOPRINE IN ANIMAL EXPERIMENTS AND IN PATIENTS WITH CHRONIC LIVER DISEASE. *(Ger.)* Bar, U.; Becker, H.; May, B.; Mayer, D.; Ohlendorf, S.; Otto, P.; Schmidt, F. W. (Med. Coll., Hannover, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:943-946, 1973.

5695 AUSTRALIA ANTIGEN, HL-A ANTIGENS, AND LYMPHOCYTE AUTOANTIBODIES IN CHRONIC AGGRESSIVE AND CHRONIC PERSISTENT HEPATITIS. *(Ger.)* Bertrams, J.; Reis, H. E.; Kuwert, E.; Selmair, H. (Dept. Med. Virol. Immunol., Univ. Essen, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:642-644, 1973.

See also, 5362, 5650, 5673, 5679, 5683, 5687, 5688.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

5696 ALCOHOLIC STEATONECROSIS. II. PROSPECTIVE STUDY OF PREVALENCE OF MALLORY BODIES IN BIOPSY SPECIMENS AND COMPARISON OF SEVERITY OF HEPATIC DISEASE IN PATIENTS WITH AND WITHOUT THIS HISTOLOGICAL FEATURE. *(E.)* Birschbach, H. R.; Harinasuta, U.; Zimmerman, H. J. (VA Hosp., Washington, D. C.). *Gastroenterology* 66(6):1195-1202, 1974.

To evaluate the clinical significance of the presence of Mallory bodies in liver biopsy specimens, 100 alcoholic patients with clinical and biochemical evidence of hepatic disease were examined. Alcoholic hyaline was found in 32 patients. Other histological evidence of parenchymal injury as well as clinical and biochemical features indicated that the hepatic disease was somewhat more severe in patients with Mallory bodies than in those without. However, this study supports the conclusions of a previous one that the syndrome of alcoholic hepatitis can present without Mallory bodies in the liver; that the prognostic significance of the Mallory body *per se* is limited; and that correlation of clinical severity with histological abnormalities also requires consideration of other changes, especially necrosis. The term *alcoholic steatonecrosis, with or without Mallory bodies* is considered to be more acurately descriptive of the histological features of the syndrome than the commonly used term of *alcoholic hepatitis*.

5697 CLINICAL CORRELATIONS IN ALCOHOLIC PATIENTS WITH MANIFEST CIRRHOSIS. *(E.)* Bordalo, O.; Batista, A.; Geraldes, J.; Neto, F.; Mascarenhas, F.; Leitao, N.; Noronha, M.; Lamy, J.; Silva, P. E. (Inst. Path. Anat., Univ. Lisbon, Portugal). *Am. J. Gastroenterol.* 61(5):371-378, 1974.

To obtain data concerning the effect of duration and quantity of alcohol consumed on liver structure and function and to ascertain the most valuable clinical and laboratory parameters for the detection of active alcoholic liver disease, 213 male alcoholics (18-63 yr, average 40.1 yr) without complaints of liver disease and 50 patients with established alcoholic cirrhosis were studied. In the alcoholic group, 38.5% reported a normal dietary intake while the rest had anorexia and showed signs of malnutrition. On the basis of previous investigations, a daily intake of 160 g ethanol was established as the critical amount for hepatotoxicity. It was found that 1/2 of the alcoholic patients drank more than 160 g ethanol/day for over 10 yr. Biopsies on 103 patients revealed steatosis in 76%, inflammation in 73%, and fibrosis in 67%, while all three were present in 52%. In addition, signs of alcoholic hepatitis showed in 12 cases (11.6%), and cirrhosis in 2 patients. The liver function tests most frequently abnormal were BSP retention, prothrombin time, and the activities of the serum transaminases (SGOT and SGPT). Correlations established were: (1) no relation of morphological abnormalities to the amount of daily ethanol intake, but the frequency and severity of those abnormalities were related to the duration of alcoholism, as were also the amount and severity of fibrosis; and (2) severe fibrosis and cirrhosis were related to a daily intake of more than 160 g ethanol, but the establishment of cirrhosis was related both to a greater than 160 g daily intake and an alcoholism duration of more than 10 yr. In the study of 50 patients with alcoholic cirrhosis, similar relationships were observed between pathologic findings and the duration and quantity of alcoholic intake. This study indicates that liver biopsy might provide the necessary information as to active liver injury without clinical symptoms in alcoholics, but the inclusion of biopsy as part of a routine examination is not always possible. Comparison of functional data with morphological observations does not provide reliable parameters for the detection of liver involvement in the chronic alcoholic. The findings here show that the threshold of hepatic toxicity is lower than 160 g ethanol/day.

5698 LIPID DROPLETS IN FATTY LIVER. AN ELECTRON MICROSCOPIC STUDY ON ULTRASECTIONS OBTAINED BY A NEW CUTTING TECHNIQUE. *(E.)*

Petersen, P. (Rigshosp., Copenhagen, Denmark). *Acta Pathol. Microbiol. Scand.* [*A*] 82(2):255-263, 1974.

In this report, results are presented of a modified technique for cutting tissues rich in lipid, e.g. alcoholic fatty liver, without distortion or artefacts, for electron microscope examination. Liver biopsies were performed on 9 patients with suspected steatosis on the basis of clinical and biochemical findings; high alcohol consumption in 7 and maturity onset diabetes in 2 cases were the presumed causes. Diagnosis of steatosis was confirmed by light microscopy as 3 slightly and 6 moderately severe cases, with no signs of cirrhosis. In the survey sections, most of the lipid droplets were strongly osmiophilic and varied greatly in size, with diameters from 0.5 to 30 μ. In the non-osmiophilic vacuoles, fine networks stainable with toluidine blue were seen. Preparation for ultrasectioning consisted of cooling specimens and all cutting equipment to 8-10 C about 10 hours before sectioning. If the temperature rose to 14 C, cutting was not satisfactory. The thickness of the ultrasections was 3-600 A. After collection on grids and mounting with parlodion and carbon films, the sections were stained with zinc-uranyl-acetate and lead citrate. Advantages of this cold-cutting technique were: (1) flat, thin sections could be cut even when biopsies contained much fat; (2) larger areas could be cut, up to 0.5 mm for side lengths of squares, thus opening a possibility of evaluating larger areas in the electron microscope correlated to the survey sections; and (3) observation of many fat accumulations in one area was possible, thereby permitting the comparison of lipid droplets of a highly varied morphology. Ultrastructurally, the osmiophilic fat droplets often contained moderately electron-dense material of a homogenous nature. Just as often, the electron-dense material appeared in an irregular arrangement; and in such droplets, a concentrically arranged layer of this osmiophilic material was seen in the periphery with less electron-dense areas in between. In this capsule-like arrangement, a great deal of strongly electron-dense granules 100-1000 A were observed; they were also to a lesser degree found near the center of the droplet. In the non-osmiophilic vacuoles, a fine network was found which appeared very finely granular, not lamellar, and therefore did not seem to represent a remnant of the endoplasmic reticulum membrane. Near the periphery of the network, a capsule-like arrangement was present in which electron-dense granules similar to those in the osmiophilic droplets were observed. Many droplets showed transition stages, and many without osmiophilic material or structures were also seen. Histochemical staining showed lipid in the droplets, but the staining was heterogeneous in many of the droplets. Osmium tetroxide α-naphthyl showed the presence of triglyceride in many vacuoles; but in some, staining was lacking and in a few, a roughly meshed network was seen. Moreover, both Oil Red O and the osmium stain revealed fat and triglyceride between some hepatocytes. Since this was observed in the 10 μ sections, it is not possible to localize this fat in either the bile capillaries, the sinusoids, or perhaps both. Dilated intercellular spaces were seen with the electron microscope, but demonstrating fat in these spaces was not possible. The strongly electron-dense granules, identified by other workers as ferritin, do not appear to have the characteristics of ferritin granules in this study since they presented a varied morphology: round, oblong, rather pointed, and larger than those described. Further examination is necessary to elucidate the nature of these structures.

5699 VASCULAR COMPLICATIONS OF SUPERIOR MESENTERIC ARTERY INFUSION WITH PITRESSIN IN TREATMENT OF BLEEDING ESOPHAGEAL VARICES. *(E.)*

Berardi, R. S. (VA Hosp., Lexington, Ky.). *Am. J. Surg.* 127(6):757-761, 1974.

Two case histories are presented which demonstrate vascular complications occurring after selective catheterization of the superior mesenteric artery for vasopressin (Pitressin) infusion in the treatment of esophageal varices. The first case was a 50-yr-old chronic alcoholic man who was admitted with massive upper gastrointestinal bleeding. Emergency esophagogastroscopy revealed bleeding esophageal varices. Infusion via the superior mesenteric artery with vasopressin to control the bleeding was initiated at a rate of about 0.3 U/min. During 48 hours, he received a total of 60 units of vasopressin without adequate control of bleeding. A Sengstaken-Blakemore tube was inserted with temporary control of bleeding. After the arterial catheter was removed, his condition deteriorated and he died. Autopsy revealed gangrene of the entire small intestine with thrombosis of the superior mesenteric artery, and recent thrombosis of the portal vein. The second case was a 53-year-old chronic alcoholic man also admitted with massive upper gastrointestinal bleeding. Immediate control of bleeding was achieved with the Sengstaken-Blakemore tube. Eight days later, when the tube was removed, bleeding recurred, and superior mesenteric artery infusion with vasopressin was begun at a rate of about 0.3 U/min and continued intermittently over the next 4 days, the patient receiving a total of 70 units of vasopressin. Bleeding was not controlled, the arterial catheter was removed, the patient went into what appeared to be hepatic coma and approximately 24 hours later, he died. Thrombosis of both the superior mesenteric artery and the portal vein was revealed on autopsy, but no evidence of necrosis was seen in the small intestine. It is to be noted that vasopressin was started when both these patients were hyposensitive. It is concluded that utmost caution should be used with this modality of treatment in a patient who is in shock or who has hypotension secondary to hypovolemia, since the most frequent complication of arterial catheterization is thrombus formation.

5700 STUDIES CONCENING THE HYPERLIPIDEMIC ACTION OF ETHANOL. *(E.)* Schlamp, R.; Gartner, U.; Becker, K. (1st Med. Clin., Univ. Hamburg, Germany). *Acta Hepatogastroenterol.* 21(2):93-100, 1974.

5701 CIGARETTES, ALCOHOLISM AND CIRRHOSIS: AN EPIDEMIOLOGICIC STUDY. *(E.)* Resnick, R. H.; Khan, S. A.; Baum, R. A.; Sampliner, R. E. (Lemuel Shattuck Hosp., Boston, Mass.). *Gastroenterology* 66 (4):764, 1974.

See also, 5080, 5167, 5180.

LIVER AND BILIARY TRACT

Cirrhosis

5702 MEDIUM CHAIN TRIGLYCERIDES AND HEPATIC ENCEPHALOPATHY. *(E.)* Morgan, M. H.; Bolton, C. H.; Morris, J. S.; Read, A. E. (Dept. Med., Univ. Bristol, England). *Gut* 15(3):180-184, 1974.

The effect of oral administration of medium (C_{8-10}) and short chain (C_6) triglycerides to 21 cirrhotic patients was studied in relation to the transport of short and medium chain fatty acids through the blood-brain barrier with consequent possible neurotoxicity and resulting encephalopathy. In the first study, 11 cirrhotic patients and 11 volunteer controls fasted overnight and then received a single 60 ml p.o. dose of coconut oil in aqueous emulsion. A second study employed 12 cirrhotic patients and 3 controls given 30 ml coconut oil p.o. 3 times/day for 1 week. Although short chain fatty acid absorption was faster than medium, the overall absorption was rapid in all cases with maximum serum levels within 2 hr after administration followed by a fall in 7 hr. Significant medium chain fatty acid levels in the cerebrospinal fluid exhibited a like pattern. In general, cirrhotic patients showed serum medium chain fatty acid levels about 3 times higher than controls. Investigation as to arterial ammonia, chlorpromazine tolerance, and venous blood sugar levels revealed no significant changes. The electroencephalograph mean dominant frequency likewise showed no significant differences between cirrhotics and controls. Since the correlation of these findings do not demonstrate any deterioration in clinical or electroencephalograph status in cirrhotic patients following medium chain triglyceride administration (even in cases with previous tendencies to hepatic encephalopathy), this study offers no confirmation of suggestions that such administration may be contraindicated in patients with cirrhosis.

5703 BIOGENESIS AND PRODUCTION OF OESTROGENS IN MALES WITH CIRRHOSIS OF THE LIVER. *(E.)* Thijssen, J. H. H.; Lourens, J.; Donker, G. H. (Univ. Hosp., Utrecht, Netherlands). *Acta Endocrinol. (suppl.)* 184:31, 1974.

The frequent development of hyperestrogenism symptoms in male patients with cirrhosis of the liver instigated this study of the peripheral conversion of androstenedione to estrone and of testosterone to estradiol (along with estrone and estradiol production rates) in cirrhotic and normal males. Continuous double isotope infusion techniques and the urinary isotope dilution method were used. Cirrhotic patients showed a substantial increase in urinary production rates of estrone and estradiol. The peripheral conversion of androstenedione to estrone was also higher in cirrhotics than in normal controls, with a positive correlation between such conversion and the severity of the cirrhosis. The conversion of testosterone to estradiol was also greater in patients than in the controls. From preliminary *in vitro* studies and from the results of one experiment with catherterization of the hepatic vein during infusion, it seems highly unlikely that the cirrhotic liver itself is responsible for the increased aromatization of androgens to estrogens.

5704 PORTAL-SYSTEMIC ENCEPHALOPATHY AND PORTACAVAL ANASTOMOSIS: A PROSPECTIVE, CONTROLLED INVESTIGATION. *(E.)* Mutchnick, M. G.; Lerner, E.; Conn, H. O. (VA Hosp., West Haven, Conn.). *Gastroenterology* 66(5):1005-1019, 1974.

Over a 15 yr period, the frequency of portal-systemic encephalopathy was determined in 100 cirrhotic patients who were included in 2 prospective, randomly controlled investigations of prophylactic portacaval anastomosis: 40 patients with patent shunts, and 60 unoperated control patients. A second nonrandomized group of 118 patients, 39 with therapeutic portacaval anastomosis and 79 without, was also analyzed. Portal-systemic encephalopathy occurred in 20% of the patients before their inclusion in the study; after inclusion, during a mean period of follow-up of more than 4 years, 35% of the control patients and 53% of the shunted patients developed encephalopathy, an insignificant difference. Severe, chronic portal-systemic encephalopathy occurred in 20% of the shunted and in only 3% of the unshunted patients. Portal-systemic encephalopathy occurred during the first 6 months in patients with portacaval anastomosis, earlier than in unshunted patients, in whom it usually occurred during the first 18 months. The most common cause of portal-systemic encephalopathy after portacaval anastomosis was dietary protein, and encephalopathy attributed to this cause appeared in 30% of the shunted patients and in 11% of the unshunted patients. In the latter, the most common cause of portal-systemic encephalopathy was gastrointestinal hemorrhage (39% of the unshunted versus 13% of the shunted). The occurrence of portal-systemic encephalopathy before inclusion did not predict postshunt encephalopathy. Approximately 50% of those who had had portal-systemic encephalopathy before randomization developed it later, whether or not they had portacaval shunts.

5705 COMPARISON OF ASCITES ULTRAFILTRATE REINFUSION WITH PLASMA EXPANSION IN THE HEPATORENAL SYNDROME AND REFRACTORY ASCITES. *(E.)* Khan, S. A.; Baum, R. A.; Iber, F. L. (Tufts Univ. Sch. Med., Boston, Mass.). *Gastroenterology* 66(4):723, 1974.

5706 CHRONIC HEPATIC ENCEPHALOPATHY TREATED WITH ORAL LACTOSE IN A PATIENT WITH LACTOSE MALABSORPTION. *(E.)* Welsh, J. D.; Cassidy, D.; Prigatano, G.; Gunn, C. G. (Univ. Oklahoma Health Sci. Ctr., Oklahoma City). *Gastroenterology* 66(4):797, 1974.

See also, 5137, 5377, 5385, 5410, 5464, 5627, 5694, 5721, 5734, 5743.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

5707 TWELVE YEARS' EXPERIENCE WITH TRANSHEPATIC INTUBATION. *(E.)* Praderi, R. C. (Univ. Uruguay, Sch. of Med., Montevideo). *Ann. Surg.* 179(6):937-940, 1974.

In surgery of biliary stenosis, whether benign or malignant, the use of transhepatic drains constitutes an excellent safety procedure. The procedure described here is based on 12 years of experience with 60 patients. This technique involves (1) hepatic perforation so the major vessels are not injured, (2) fitting the tube to the lead, preferably by tying them together after perforation of the liver through the choledochostomy, and (3) making lateral perforations in the catheter. Postoperative management includes permanent clamping of the anastomosis only when no further leakage has been ascertained by cholangiogram, and removal of the tube 2-8 months postoperatively only if the course is uneventful. This technique has been employed for 42 patients with biliary cancers, 18 with postoperative strictures of the common bile duct, 1 with sclerosing cholangitis, and 1 with intrahepatic lithiasis. Of the 42 biliary cancers, only 12 were resected; 19 had supratumoral short-circuits and 11 were caliber-recorded. One death from hemorrhage occurred in a patient with a benign stenosis, and 3 patients developed right subdiaphragmatic abscesses which required drainage. Although leakage occurred frequently, none of the patients developed diffuse biliary peritonitis in the enterobiliary anastomoses.

5708 LIVER STRUCTURE AND FUNCTION IN CHOLELITHIASIS: EFFECT OF CHENODEOXYCHOLIC ACID. *(E.)* Bell, G. D.; Mok, H. Y. I.; Thwe, M.; Murphy, G. M.; Henry, K.; Dowling, R. H. (Hammersmith Hosp., London, England). *Gut* 15(3):165-172, 1974.

Hepatic function and histology were studied in 28 patients with cholelithiasis during treatment with chenodeoxycholic acid, as compared to 5 patients with gallstones given no medical therapy. Function was analyzed before and during treatment for periods from 6 weeks to 15 months in 25 patients receiving chenodeoxycholic acid (0.5 to 1.5 g/day) p.o. and in 3 patients given 0.25 g/day p.o. Serum bilirubin, albumin, and globulin levels were essentially normal during the treatment period, and there were no significant changes in the mean levels of 4 circulating liver enzymes studied: alkaline phosphatase, γ-glutamyl transpeptidase, SGOT, and isocitrate dehydrogenase. The clearance of a single bolus injection of BSP (5 mg/kg) showed no significant difference during the first 25 min, but during the following 35 min, clearance was more rapid in the treated patients than in the untreated. Mean fasting serum bile acid concentrations, both before and during treatment, were significantly greater than control values. Liver histology was interpreted as being not appreciably diferent in the 11 patients biopsied during treatment, 3 patients biopsied 3-4 months after completion of treatment and those patients not receiving chenodeoxycholic acid treatment. Of 2 patients on chenodeoxycholic acid however, 1 showed mild proliferation of bile ducts and 1 showed moderate to marked fatty change (in the absence of diabetes, obesity, or a history of alcohol intake). The results suggest no chenodeoxycholic acid hepatoxicity to man in doses of 0.5-1.5 g/day as used here, but more detailed long term-studies are required.

5709 SCLEROSIS OF THE EXTRAHEPATIC BILE DUCTS. *(E.)* Peck, J. J.; Kern, W. H.; Mikkelsen, W. P. (Hosp. Good Samaritan Med. Ctr., Los Angeles, Calif.). *Arch. Surg.* 108(6):798-800, 1974.

Evaluation of malignancy was made in this retrospective study of 13 patients (10 women and 3 men) with extrahepatic bile duct fibrosis or sclerosis seen over a period of 10 years. All were admitted with obstructive jaundice associated with elevated serum bilirubin and alkaline phosphatase levels; duration of symptoms ranged from 1 month to 6 yr. Hepatomegaly was present in all patients, but only 1 had fever, and none had eosinophilia. Operative reports described diffuse or beaded rope-like thickening of the common bile duct, either localized or extending the entire length. Histologic examination of the common bile duct in 8 patients definitely established a clear-cut diagnosis of sclerosing carcinoma. In the remaining 5 patients, although study was suggestive of malignancy, absolute diagnosis of carcinoma was not possible; however, autopsy examinations of 3 of these patients did establish carcinoma. The last 2 patients are still living but their diagnoses remain equivocal. This study demonstrates the difficulty of differentiating between benign disease and malignancy in the common bile duct. It is felt that the majority of diagnoses of primary sclerosing cholangitis may eventually be identified as carcinoma.

5710 EFFECTS OF CLOFIBRATE AND OF AN ESTROGEN-PROGESTIN COMBINATION ON FASTING BILIARY LIPIDS AND CHOLIC ACID KINETICS IN MAN. *(E.)*

Panveliwalla, D.; Ahrens Jr., E. H. (Mt. Sinai Sch. Med., City Univ., New York, N.Y.). *Gastroenerology* 66(4): 565-573, 1974.

The influence of clofibrate (2 g/day) and of estrogen plus progesterone (initial doses, 2.5 and 10 mg/day, resp.) on fasting biliary lipids and on cholic acid kinetics was studied in 10 recently cholecystectomized patients, 2 of whom had hyperlipidemia. Uninfected hepatic bile was collected periodically up to 4.5 months through a closed indwelling cystic duct catheter. Thus, the integrity of the enterohepatic circulation was preserved. Clofibrate (7 patients) and female sex hormones (3 patients) caused rises in the concentrations of biliary cholesterol and reductions in the bile acid levels, but no consistent changes in the phospholipid concentrations. Studies of cholic acid kinetics in 3 patients showed diminutions in the daily synthesis rates and pool sizes with both drugs. These changes in biliary lipids resulted in increased bile lithogenicity (bile supersaturated with cholesterol). Since an increased incidence of cholesterol gallstones would be predicted in patients habitually taking clofibrate and in women using oral contraceptives, cholecystography may be indicated prior to the institution of long term use of these drugs. Gastrointestinal symptoms in such patients should be evaluated in light of the increased risk of cholelithiasis.

5711 CHOLELITHIASIS IN CHILDHOOD. *(E.)*

MacMillan, R. W.; Schullinger, J. N.; Santulli, T. V. (Babies Hosp., Children's Med. Surg. Ctr. New York). *Am. J. Surg.* 127(6):689-692, 1974.

Surgical experience with cholelithiasis in 21 patients, 6-16 yr old, is presented. Vague distress or abdominal pain in the right upper quadrant was the most common complaint. Seven patients had jaundice. Roentgenologic examination was diagnostic of biliary tract disease in 19 of the patients. In 15 patients, calculi were demonstrated on oral cholecystogram or i.v. cholangio gram. Fifteen patients had hemolytic anemia. Congential hemolytic spherocytosis appeared in 5 cases. Five black children of the series either had sickle cell anemia or were heterozygous for hemoglobin S and C. Thalassemia major was an associated condition in 2 patients; thalassemia minor in 1; pyruvate-kinase deficiency in 1; and glucose-6-phosphate dehydrogenase deficiency in 1. Pathologic diagnosis was based on histologic examination: the majority of patients (52%) had evidence of mucosal destruction of the gallbladder with round cell infiltration and fibrosis indicative of chronic inflammation. Seven patients had a normal gallbladder, despite the presence of stones. Three patients had subacute cholecystitis. Of the patients with chronic cholecystitis, 73% were symptomatic; of the patients with a normal gallbladder, 71%. Cholelithiasis in every patient was treated by cholecystectomy. There were 5 choledochotomies, 2 of which revealed stones. Postopertive complications occurred in 4 patients: pneumonia in 2; thalassemia major in 1 with a decrease in hematocrit level; transient hematobilia in 1 with spherocytosis after choledochotomy, which subsided spontaneously. The peak incidence of gallstones occurred in patients between 10 and 13 years of age. Oral cholecystography was the diagnostic method of choice. These data indicate once the diagnosis of cholelithiasis is established, the treatment of choice is cholecystectomy. If indicated for hematologic reasons, splenectomy may be performed at the same operation with little increased risk to the patient.

5712 THE EFFECT OF CHOLECYSTECTOMY ON OESOPHAGEAL SYMPTOMS. *(E.)*

Barker, J. R.; Alexander-Williams, J. (North Devon Infirm., Barnstaple, England). *Br. J. Surg.* 61(5):346-348, 1974.

A prospective study was made of 225 patients with gallbladder disease treated by cholecystectomy. Of these, 77 (34%) complained of esophageal symptoms; after cholecystectomy 44 (20%) continued to have these symptoms. Before cholecystectomy, 64 complained of heartburn; 47 of reflux; and 10 of dysphagia. After cholecystectomy, 36 complained of heartburn; 29 of reflux; and 9 of dysphagia. Patients in the 50 to 59 yr age group had the highest incidence of esophageal symptoms before cholecystectomy and lowest rate of cure of symptoms after cholecystectomy. In patients with reflux on barium studies and/or an enlarged hiatus at operation, the incidence of esophageal symptoms was 60%; less than 20% of these were improved by cholecystectomy. Esophageal systoms were less common in men (27%) than in women (37%), but only 29% of the men were cured by cholecystectomy, as compared with a 45% cure rate in women. The findings support the hypothesis that there is an association between esophageal symptoms and gallbladder disease and that in some cases cholecystectomy may improve these symptoms.

5713 BILIARY LIPID SECRETION BEFORE AND AFTER CHOLECYSTECTOMY IN AMERICAN INDIANS WITH CHOLESTEROL GALLSTONES. *(E.)*

Alder, R. D., Metzger, A. L.; Grundy, S. M. (Natl. Inst.

Arthritis, Metabolism, Digestive Dis., Phoenix Indian Med. Ctr., Ariz.). *Gastroenterology* 66(6):1212-1217, 1974.

The effects of cholecystectomy on the hepatic secretion rates of biliary lipids and the relative lipid composition of hepatic bile were examined in 8 American Indian patients (7 female, 1 male) with cholesterol gallstones. Using a marker dilution technique, the hepatic secretion rates of cholesterol, bile acids, and phospholipids were measured during continous duodenal infusion of a liquid formula containing fat, carbohydrate, and protein before and several months after cholecystectomy. The infusion procedure was used to stimulate enterohepatic circulation of bile acids, during which the gallbladder does not contribute significantly to bile flow. Under these conditions, both pre- and postoperative results may be expected to reflect steady state hepatic bile secretion. Before surgery, the patients secreted hepatic bile that was more lithogenic than that in a group of white women without stones. When bile was sampled under identical conditions after cholecystectomy, there was no change in biliary lipid composition or in hepatic secretion rates. Thus contrary to previous reports, cholecystectomy apparently does not correct the defect leading to lithogenic bile in these patients.

5714 SUBDIAPHRAGMATIC ABSCESSES AFTER HEPATIC SURGERY. *(Rus.)* Shapkin, V. S. (Vladivostok Med. Inst., USSR). *Klin. Khir.* (7):6-9, 1973.

5715 NONOPERATIVE EXTRACTION OF RETAINED BILIARY TRACT STONES REQUIRING MULTIPLE SESSIONS. *(E.)* Burhenne, H. J.; Richards, V.; Mathewson, Jr., C.; Westdahl, P. R. (Children's Hosp., San Francisco, Calif.). *Am. J. Surg.* 128 (2):288-292, 1974.

5716 CHRONIC ACALCULOUS CHOLECYSTITIS. *(Rus.)* Milonov, O. B.; Smirnov, V. A.; Kurganov, A. S. (All-Union Sci. Res. Inst. Clin. Exp. Surg., Moscow, USSR). *Khirurgiia (Mosk.)* (10):94-99, 1973.

5717 TWO CASES OF ASEPTIC NECROSIS OF THE EXTRAHEPATIC BILIARY TRACT FOLLOWING CHOLANGIOGRAPHY DURING SURGERY. *(Fr.)* Popovivi, G. I.; Andreoiu, C.; Mocanu, A.; Onofrei, T.; Potirniche, A. (Dept. Surg., Becau, Rumania). *Lyon Chir.* 70(3):199-201. 1974.

5718 EXPERIENCES WITH SURGICAL RECONSTRUCTION OF THE HEPATIC DUCTS. *(E.)* Williams, G. R. (Univ. Oklahoma Health Sci. Ctr., Oklahoma City). *Ann. Surg.* 179(5):540-548, 1974.

5719 THE REMOVAL OF BILIARY DUCT STONES. *(E.)* Bartlett, M. K.; Warshaw, A. L.; Ottinger, L. W. (Massachusetts Gen. Hosp., Boston). *Surg. Clin. North Am.* 54(3):599-611, 1974.

5720 GALLBLADDER VISUALIZATION FOLLOWING HEPATIC ARTERIOGRAPHY FOR HEMANGIOMA. *(E.)* Frey, A. A.; Ranninger, K.; Roth, F. J. (Med. Coll. Virginia, Virginia Commonwealth Univ., Richmond). *Am. J. Dig. Dis.* 19(5):477-483, 1974.

5721 ISOLATED ACTINOMYCOSIS OF THE LIVER AND BILIARY TRACT AFTER CHOLECYSTECTOMY. *(Ger.)* Kuhn, H.; Fleischer, E. M. (St. Georg Reg. Hosp., Leipzig, Germany). *Z. Gesamte Inn. Med.* 29(8):343-347, 1974.

5722 THE INTRAVENOUS GLUCOSE TOLERANCE TEST IN PATIENTS WITH CHOLELITHIASIS AND CIRRHOSIS. *(Ger.)* Ratzmann, K. P.; Meyer, L. W.; Baufeld, W. (Med. Clin. Ernst Moritz Arndt Univ., Greifswald, Germany). *Z. Gesamte Inn. Med.* 29(8):331-333, 1974.

5723 TOTAL PRIMARY NECROSIS OF THE COMMON BILE DUCT. *(Fr.)* Melliere, D.; Bloch, P.; Germain, A. (Fac. Med. Creteil, Univ. Paris, France). *Arch. Fr. Mal. App. Dig.* 63(2):123-129, 1974.

5724 COMMON BILE DUCT OBSTRUCTION BY GRANULAR CELL TUMOR (SCHWANNOMA). *(E.)* Whisnant, Jr., J. D.; Bennett, S. E.; Huffman, S. R.; Weiss, D. L.; Parker, J. C.; Griffen, Jr., W. O. (Univ. Kentucky Coll. Med., Lexington). *Am. J. Dig. Dis.* 19(5):471-476, 1974.

5725 RETAINED CALCULI WITHIN THE BILIARY DUCTAL SYSTEM. *(E.)* Glenn, F. (New York Hosp.-Cornell Med. Ctr., N.Y.). *Ann. Surg.* 179(5):528-539, 1974.

5726 SPONTANEOUS PERFORATION OF THE EXTRAHEPATIC BILE DUCTS AND BILE PERITONITIS IN INFANCY. *(E.)* Lilly, J. R.; Weintraub, W. H.; Altman, R. P. (George Washington Univ. Med. Ctr., Washington, D.C.). *Surgery* 75(5):664-673, 1974.

See also, 5131, 5143, 5152, 5191, 5201, 5367, 5372, 5375, 5404, 5405, 5412, 5418, 5541, 5634.

5727 THE ORIGIN OF HUMAN FECAL ALKALINE PHOSPHATASE. *(E.)*

Horrigan, F. D.; Danovitch, S. H. (Washington Hosp. Ctr., D.C.). *Am. J. Dig. Dis.* 19(7):603-608, 1974.

Fecal alkaline phosphatase activity may derive from biliary secretions, desquamated intestinal epithelial cells, and/or colonic flora. To determine bacterial and biliary contributions, alkaline phosphatase activity in stool specimens from 6 adult patients was compared with the activity in human bile (2 subjects) and in small intestinal mucosal homogenates (12 subjects). Fecal activity was similar to that of jejunal mucosa in respect to specific activity, Michaelis-Menten constants, L-phenylalanine inhibition, and electrophoretic mobility on polyacrylanide gel. It is concluded therefore that fecal alkaline phosphatase activity is predominantly derived from the small intestine, which means that stool specimens may provide a potential source of the intestinal isoenzyme for study and also may have some diagnostic significance.

5728 ROENTGENOLOGIC MANIFESTATIONS OF GASTROINTESTINAL SCLERODERMA. *(E.)*

Kolar, J.; Drugova, B.; Stava, Z. (Charles Univ. Med. Fac., Prague, Czechoslovakia). *Acta Univ. Carol.* [*Med.*], *(Praha)* 17(7/8):595-616, 1973.

Repeated x-ray examinations were made over a 15 yr period in a group of 122 patients (109 females and 13 males, aged 11-71 yr) suffering from confirmed scleroderma. A general incidence of 94.2 % of positive radiographic findings using liquid barium was found after repeated investigations on the patients and comparisons of their events. Eighty patients were classified as having scleroderma, mostly generalized or polytopic except in 4 circumscribed cases; 1 patient had a rapidly progressive malignant scleroderma; 42 had acrosclerosis with Raynaud's phenomenon. Esophaegeal changes are the most common and radiologic findings include prolonged transit time through the esophagus, tendency for the esophagus to stay open after the bolus of barium has passed, formation of an air-fluid column, disappearance of the mucosal folds as the severity of the esophageal involvement increases, retention of barium with dilatation of the lumen, peptic esophagitis of the lower third, sliding hiatal hernia, and esophageal cancer. Involvement in the stomach may be indicated by dilation and delayed emptying, occasionally by a narrowing or spasm in the antrum of the stomach, and by marked aerogastria. However, no specific changes in the stomach were noted which would allow diagnosis to be made without additional proof obtained by endoscopy or microscopic examination. The small bowel was the second most commonly involved section of the gastrointestinal tract in scleroderma. Roentgenologic examinations showed dilatation of the small bowel with abnormal air filling and narrowing in the distal portion of the duodenum. The sclerodermic involvement of the colon remains uncertain regarding incidence and diagnostic criteria. The colon may appear atonic or dilated or there may be alternating areas of sacculation and rigid narrowings with thickened longitudinal folds in the narrowed segments. No immediate correlation between the extent of gastrointestinal and dermal involvement and positive gastrointestinal symptoms could be made. Follow-up radiological studies aid in assessing the general prognosis of the disease.

5729 ESSENTIAL FATTY ACID DEFICIENCY IN PATIENTS WITH LESIONS OF THE GASTROINTESTINAL TRACT.

(E.) Wapnick, S.; Norden, D. A.; Venturas, D. J. (Dept. Surg., Univ. Rhodesia, Salisbury). *Gut* 15(5): 367-370, 1974.

To analyze previous reports of deranged ratios of some unsaturated fatty acids in serum phospholipid after extensive bowel resection and of changes in the ratios of trienoic to tetraenoic acids as indicative of essential fatty acid deficiency in rats, this study was undertaken on 14 patients with small intestine resection, 10 patients with carcinoma of the esophagus, and 28 normal controls, all Rhodesian Africans on the traditional local maize diet. Tests for total serum lipid and for the relative amounts of unsaturated fatty acids (oleic, linoleic, linolenic, arachidonic, and eicosatrienoic) in serum lipids showed that both groups of patients had patterns of unsaturated fatty acid ratios suggesting essential fatty acid deficiency. Although some indications of such fatty acid deficiency appeared in the controls, the difference between patients and controls was significant. However, in the resection patients, there was no correlation between the extent of intestinal removal and the extent of change in the unsaturated fatty acid pattern. It is not known what damage (if any) such an essential fatty acid deficiency can do to the human, but these compounds have been shown to play a role in the maintenance of the cell membrane integrity which may affect both erythrocytes and mitochondria. Therefore, results seen here may indicate a case for supplementation of the low fat diet normally recommended with small amounts of unsaturated fat.

5730 AN UNUSUAL FORM OF MACROAMYLASEMIA. *(E.)*

Berggren, T.; Levitt, M. D. (Univ. Minnesota Hosp., Minneapolis). *Gastroenterology* 67(1):149-154, 1974.

In previously studied macroamylases, the molecular weight was considerably larger than normal serum amylase and was therefore easily documented by crude gel filtration techniques. This report describes a persistently elevated serum amylase level resulting from an unusual macroamylase which was only marginally larger than normal, found in a 69-yr-old housewife. However, the slightly increased size of this enzyme markedly influenced its renal clearance; and the existence of this macroamylase was first suspected because of the patient's consistently low urinary amylase to creatinine ratio. Although normally macroamylasemia is characterized by a normal or low urinary amylase in contrast to elevated serum amylase, the mildly elevated rates of urinary excretion seen here probably reflect the slow but appreciable rate of glomerular filtration of the relatively small-sized macroamylase when ordinarily the glomerulus is totally impermeable to larger forms of macroamylase. Careful gel filtration study was required to document the small increase in size of this enzyme. Isoelectric focusing showed the macroamylase to have a lower isoelectric point than did the 2 major components of normal serum amylase. Since previous studies have suggested that salivary amylase was cleared more slowly by the kidney than pancreatic amylase, the patient's saliva was diluted 1:50 and chromatographed to determine whether the serum amylase might represent her salivary amylase. This possibility was excluded by results which showed that her serum amylase eluted more rapidly than did the salivary amylase. Finally, if as is presumed the serum amylase levels in macroamylasemia are largely determined by the amount of binding substance in the serum, the wide swings of serum amylase levels observed in this patient over a period of several days suggest that there were rapid fluctuations in the serum concentration of this amylase-binding substance.

5731 RADIOIMMUNOLOGICAL MEASUREMENTS OF BACTERIAL ANTIBODIES. II. HUMAN SERUM ANTIBODIES REACTIVE WITH Bacteroides fragilis AND Enterococcus IN GASTROINTESTINAL AND IMMUNOLOGICAL DISORDERS.

(E.) Brown, W. R.; Lee, E. (Veterans Administration Hosp., Denver, Colo.). *Gastroenterology* 66(6):1145-1153, 1974.

In this study the normal concentrations of antibodies of 3 Ig classes to members of 3 genera of intestinal bacteria and the levels of these antibodies in some diseases were determined. Serum antibodies to *Bacteroides fragilis* and an *Enterococcus* species were measured by a radioimmunological technique similar to that used for measurement of antibodies to *Escherichia coli*. Concentrations of IgG, IgA, and IgM antibodies were determined in healthy subjects and in several groups of patients with gastrointestinal disorders. In healthy subjects, the concentrations of antibodies within each immunoglobulin class to *B. fragilis*, *Enterococcus*, and *E. coli* were of the same order of magnitude, despite marked differences in total, numbers of these organisms in contents. IgG and IgM antibodies quantitatively predominated over IgA antibodies. In gastrointestinal disorders, concentrations of antibodies to *Enterococcus* were normal or only moderately elevated. Concentrations of antibodies to *B. fragilis* often were elevated particularly in regional enteritis and chronic ulcerative colitis where increases in all 3 classes of antibodies of as much as 14 times were observed; antibody levels were roughly correlated with severity and pyogenic complications of these diseases. More moderate antibody elevations were found in patients with nontropical sprue, small bowel bacterial overgrowth, and chronic liver diseases. IgG antibodies to *B. fragilis*, as to *E. coli*, were elevated in patients with selective deficiency of serum and secretory IgA. Results of these studies provide evidence that: (1) concentrations of serum antibodies to intestinal bacteria are not influenced by the relative numbers of various bacteria inhabiting the intestine; (2) serum IgG and IgM antibodies to the bacteria studied are quantitatively greater than IgA antibodies; (3) increased concentrations of antibodies to *B. fragilis* in the chronic inflammatory bowel diseases most likely are consequences of the diseases, but a pathogenetic role of *Bacteroides* is a possibility; and (4) absence of IgA from intestinal fluids might result in increased synthesis of serum IgG antibacterial antibodies.

5732 THE BACTERIAL ETIOLOGY OF PNEUMATOSIS CYSTOIDES INTESTINALIS.

(E.) Yale, C. E.; Balish, E.; Wu, J. P. (Univ. Wisconsin Med. Sch., Madison). *Arch. Surg.* 109(1):89-94, 1974.

The natural course of pneumatosis cystoides intestinalis was studied in 73 germ-free Sprague-Dawley rats of both sexes, monocontaminated by either an i.p. (7.9 x 10^8 viable cells/ml) or submucosal (7.9 x 10^4 viable cells/ml) injection of a pure culture of *Clostridium perfringens*. Unsuccessful efforts were made to produce the disease in 10 germfree rats by similar monocontaminations with each of nine other species of bacteria, including *Escherichia coli* and *Enterobacter aerogenes*. The results showed that at least one species of bacteria, *C. perfringens*, could consistently produce the disease in germfree rats, with lesions similar in all respects to those found in humans. The disease was of limited duration: it took several days for the pneumatosis cystoides intestinalis to develop, and the intensity of the reaction appeared to be decreasing by 43 days. The disease did not occur in any of the controls that were unoperated but were monocontaminated with *C. perfringens*. Thus, it is believed that bacteria must come into contact with some traumatized tissue for the condition to occur. Appearance of gas cysts in the wounds after i.p. but not after i.m. injection suggests that the appearance of the lesions is related to the concentration of the organisms in the injured tissue. It is suggested that most pneumatosis cystoides intestinalis originates by contamination of the wall of the intestine through a mucosal injury, and that omental or wound gas-filled cysts occur only if the peritoneal cavity is contaminated in some manner. While these experiments do not disprove the theories advanced by others for the cause of this condition, it is believed the neoplastic theory is highly unlikely and that probably the neoplastic ulcer is the break in the mucosa that allows the bacteria (*C. perfringens*) to enter the injured tissue. The fact that intestinal pneumatosis cystoides intestinalis can occur after minimal injury and after i.p. monocontamination with this bacteria makes the biochemical, mechanical, and nutritional theories even less acceptable as possible alternative causes.

5733 GASTROINTESTINAL PROTEIN LOSS INDUCED BY ^{60}CO IRRADIATION OF THE ABDOMEN IN MICE.

(E.) Frankendal, B. (Dept. Gynecol. Radiat. Therapy, Univ. Umea, Sweden). *Acta Radiol.* [*Ther.*] *(Stockh.)*. 13(1):65-82, 1974.

The effect of different doses of irradiation, as judged by fecal activity, was investigated in 98 female NMRI mice. The extent to which the gastrointestinal protein loss varied with the size of the irradiation dose and with the interval after irradiation was considered. The source to skin distance was 35 cm and the absorbed dose rate was 860 ± 10 rad/min. The animals were irradiated with a total dose of 500, 1000, 2000, or 3000 rad given in daily fractions of 500 rad. Three days after the last irradiation a tracer, $^{51}CrCl_3$, was injected. Feces and urine were collected for 4 days. Since ^{51}Cr unites mainly with the plasma protein transferrin, this was taken as a measure of its leakage into the intestine. Abdominal irradiation was followed by increased loss of ^{51}Cr in the feces after irradiation with a total dose of 1000 rad in 2 equal fractions at a one day interval. Increasing the radiation dose did not produce any further increase in the loss of tracer in the feces. Mice irradiated with 1000 rad survived the 80 day observation period; thus this dose may be regarded as sublethal. These animals lost weight by 6 days after the end of irradiation but recovered their original weight within the following week. Seventy-five days after the end of irradiation, increased excretion of tracer in the feces was noted, suggesting that gastrointestinal changes may be irreversible.

5734 PAROXYSMAL NOCTURNAL HEMOGLOBINURIA ASSOCIATED WITH HEPATIC AND PORTAL VENOUS THROMBOSIS. *(E.)* Grossman, J. A.; McDermott, W. V., Jr. (Harvard Surg. Service, Boston City Hosp., Mass.). *Am. J. Surg.* 27(6):733-736, 1974.

Portal hypertension associated with other causes than hepatic cirrhosis is described in this report of 2 cases of an uncommon hematologic disorder, paroxysmal nocturnal hemoglobinuria, manifested by portal bed block. Mortality of 50% is associated with thrombotic phenomena of renal, mesenteric, cerebral, or peripheral vessels as well as portal vein occlusion. Also called Marchiafava-Micheli syndrome, this condition is a form of chronic hemolytic anemia characterized by hemoglobinuria, and is most prominent at night. The cause, at least in part, is an abnormality of the red blood cell membrane which increases its susceptibility to hemolysis in an acid medium and in the presence of serum complement. Patients seem to be particularly prone to infection. In one woman patient (55 yr old) polycystic hepatic and renal disease was present for 17 yr. Upon hospitalization, an inferior vena cavagram showed extrinsic pressure of the vena cava secondary to large hepatic cysts, and a hepatic venogram revealed complete occlusion of the main left hepatic vein. At postmortem, this vein was seen to be occluded by organized thrombus; a number of other major thrombi were evident including a partial, old one in the right main hepatic vein. Death precluded the development of a complete picture of portal hypertension; however, the early stages of portal bed block of the Budd-Chiari type were apparent. The 2nd patient, a 27 yr old woman in whom anemia was noted 10 years previously, was admitted to the hospital for anemia, hematemesis, and melena. Endoscopy showed that gastroesophageal varices were the source of hematemesis, while a celiac angiogram demonstrated splenic and proximal portal vein thrombosis. With a basic objective of decompression of varices and prevention of variceal hemorrhage, surgery included portal-azygos disconnection, splenectomy, and pyloroplasty, as well as anticoagulation treatment. The patient made an uncomplicated recovery. Since portal hypertension secondary to extrahepatic thrombotic occlusion may be more frequent than indicated by the scant literature, more information will be required to assess treatment, especially the effectiveness of the surgical approach used here.

5735 GASTROINTESTINAL DIVERTICULA. *(Sp.)* de la Fuente Perucho, A. (Clin. Hosp., Fac. Med., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 42(6): 617-646, 1974.

5736 TUMOR OF THE PAROTID ACINAR CELLS: PRESENTATION OF ONE CASE. *(Sp.)* Serra, D. E.; Jofre Gutierrez, J. A.; Oliva Otero, G. (Fac. Med. Sci., Cuyo Univ., Mendoza, Argentina). *Rev. Esp. Enferm. Apar. Dig.* 42(6):725-728, 1974.

5737 GASTRIN RELEASE FROM ZOLLINGER-ELLISON TUMOR CELLS IN TISSUE CULTURE. *(E.)* Lichtenberger, L. M.; Lechago, J.; Dockray, G. J.; Passaro, Jr., E. (VA Wadsworth Hosp. Ctr., Los Angeles, Calif.). *Gastroenterology* 66(4):851, 1974.

5738 ENTEROPATHOGENICITY AND ENTEROTOXIGENICITY OF HUMAN ENTEROPATHOGENIC Escherichia coli. *(E.)* Sakazaki, R.; Tamura, K.; Nakamura, A.; Kurata, T.; Gohda, A.; Takeuchi, S. (Natl. Inst. Health., Tokyo, Japan). *Jap. J. Med. Sci. Biol.* 27(1):19-33, 1974.

5739 SERUM GASTRIN-CALCIUM CORRELATIONS DURING CALCIUM AND SECRETIN INFUSIONS IN THE ZOLLINGER-ELLISION SYNDROME. *(E.)* Kolts, B. E.; Herbst, C. A.; McGuigan, J. E. (no affil.). *J. Clin. Invest.* 53(6):41a, 1974.

5740 A COMPARATIVE CLINICAL STUDY WITH ETHACRIDINE LACTATE AND A COMBINATION OF CHLORAMPHENICOL/STREPTOMYCIN IN THE TREATMENT OF DIARRHOEA. *(E.)* Bhandari, B.; Agarwal, M. L.; Punglia, J. L. (Med. Coll., Udaipur, India). *Ind. Pediatr.* 10(12):725-728, 1973.

5741 MANAGEMENT OF AN ABDOMINAL MASS IN INFANTS UNDER ONE YEAR OF AGE. *(E.)* Rohatgi, M.; Kashyap, R. K. (All India Inst. Med. Sci., New Delhi). *Ind. Pediatr.* 10(12):717-720, 1973.

5742 CONGENITAL GASTROINTESTINAL TRACT ANOMALIES. *(E.)* Rao, K. S.; Rao, V. S.; Murty,

V. M.; Marar, G. S.; Reddi, Y. R. (Niloufer sp., Hyderabad, India). *Ind. Pediatr.* 10(12):711- 6, 1973.

43 SELECTIVE INTRAARTERIAL VASOPRESSIN IN THE TREATMENT OF UPPER GASTROINTESTINAL MORRAGE: A CONTROLLED CLINICAL TRIAL. *(E.)* nn, H. O.; Ramsby, G. R.; Storer, E. H. (VA sp., West Haven, Conn.). *Gastroenterology* (4):880, 1974.

44 A COMPARISON OF LIQUID AND SOLID POTASSIUM CHLORIDE ON FECAL BLOOD LOSS IN HUMANS. *.)* Rider, J. A.; Manner, R. J. (Ralph K. Davies d. Ctr., San Francisco, Calif). *Gastroenterology* (4):861, 1974.

45 SUPPRESSION OF ATTACKS OF FAMILIAL MEDITERRANEAN FEVER (FMF) BY CHRONIC LOW SE COLCHICINE THERAPY. *(E.)* Goldfinger, S. E. assachusetts Gen. Hosp., Boston). *Gastroenterology* (4):842, 1974.

746 ORAL LACTOSE (LTT) AND SUCROSE (STT) TOLERANCE TESTS, INTESTINAL DISACCHARIDASES DD) AND HISTOLOGY IN CHILDREN WITH CHRONIC DIARRHEA: OMPARISON OF RESULTS. *(E.)* MacAdam, A. M.; oley, J. R.; Bhatia, M.; Welsh, J. D. (Oklahoma ildren's Mem. Hosp., Oklahoma City). *Gastro-nterology* 66(4):735, 1974.

747 GASTROINTESTINAL PERFORATION IN PATIENTS WITH CANCER. *(E.)* Lundy, J.; Kurtz, .; Turnbull, A.; Fortner, J. G.; Sherlock, P. Mem. Sloan-Kettering Cancer Ctr., New York, N.Y.). *astroenterology* 66(4):734, 1974.

748 HAEMOLYTIC-URAEMIC SYNDROME IN TYPHOID FEVER. *(E.)* Baker, N. M.; Mills, A. E.; achman, I.; Thomas, J. E. P. (Mpilo Central Hosp., ulawayo, Rhodesia). *Br. Med. J.* 2(5910):84-87, 974.

749 A PROSPECTIVE RANDOMIZED STUDY OF THE MANAGEMENT OF UPPER GASTROINTESTINAL EMORRHAGE. *(E.)* Sandlow, L. J.; Becker, G. H.; pellberg, M. A.; Allen, H. A.; Berg, M.; Berry, . H.; Newman, E. A. (Michael Reese Hosp., Chicago, ll.). *Am. J. Gastroenterol.* 61(4):282-289, 1974.

750 A CONTROLLED CLINICAL TRIAL OF TRIMETHOPRIM-SULPHAMETHOXAZOLE IN SHIGELLA YSENTERY. *(E.)* Mabadeje, A. F. B. (Coll. Med., niv. Lagos, Nigeria). *J. Trop. Med. Hyg.* 77(3): 0-54, 1974.

5751 GASTROINTESTINAL BLEEDING. *(Fl.)* Kerremans, R. (St. Rafael Univ. Hosp., Louvain, Belgium). *Tijdschr. Geneesk.* 29(13): 617-623, 1973.

5752 VALUE OF A HEPATOTROPIC DRUG IN GASTROINTESTINAL SURGERY. *(Fr.)* Doutre, L. P.; Perissat, J.; Coustou, R.; Magendie, P. (St. Andre Hosp., Bordeaux, France). *Ann. Gastroenterol. Hepatol. (Paris)* 9(4):403-406, 1973.

5753 SYNTHESIS OF Vi ANTIBODIES IN PATIENTS WITH TYPHOID FEVER AND IN CHRONIC TYPHOID CARRIERS. *(Rus.)* Karmanov, M. I. (I. M. Sechenov 1st Moscow Med. Inst., USSR). *Sov. Med.* 36(5): 149-150, 1973.

5754 GASTROINTESTINAL GAS. *(Fl.)* Ponette, S. (St. Rafael Univ. Hosp., Louvain, Belgium). *Tijdschr. Geneesk.* 29(13):639-641, 1973.

5755 ANTIBIOTICS IN GASTROENTEROLOGY. *(Fl.)* Trimpeneers; Beckers, J.; Kerremans, R. (St. Rafael Univ. Hosp., Louvain, Belgium). *Tijdschr. Gastroenterol.* 16(2):133-138, 1973.

5756 FUNDAMENTALS OF THE PALLIATIVE TREATMENT OF INOPERABLE GASTROINTESTINAL CANCER. *(Sp.)* Nasio, J. (no affil.). *An. Paulistas Med. Cir.* 101(1):5-8, 1974.

5757 ENTERIC PHASE IN THE PATHOGENESIS OF ACUTE INTESTINAL INFECTIONS. *(Rus.)* Bliuger, A. F. (Riga Med. Inst., USSR). *Ter. Arkh.* 45(7): 47-52, 1973.

5758 IDENTIFICATION OF AN N-TERMINAL FRAGMENT OF HEPTADECAPEPTIDE GASTRIN IN THE SERUM OF PATIENTS WITH ZOLLINGER-ELLISON SYNDROME (ZES). *(E.)* Dockray, G. J.; Walsh, J. H. (VA Wadsworth Hosp. Ctr., Los Angeles, Calif.). *Gastroenterology* 66(4):874, 1974.

See also, 5376, 5389, 5392, 5395, 5397, 5421, 5441, 5568.

GENERAL

Parasitology

5759 INTESTINAL PARASITE SURVEY OF KINDERGARTEN CHILDREN IN NEW ORLEANS *(E.)* Hubbard, D. W.; Morgan, P. M.; Yaeger, R. G.; Unglaub, W. G.; Hood, M. W.; Willis, R. A. (Tulane Univ. Sch. Pub. Health Trop. Med., New Orleans, La.). *Pediatr. Res.* 8(6):652-658, 1974.

A survey of intestinal helminths and protozoa was conducted in New Orleans public schools on 887 Negro kindergarten children (5 yr old) from whom 1 or more stool samples were collected. Of the sample population, 30.8% were infected with 1 or more species of intestinal parasites. One or more of the medically important species were found in 19.1%. The composite prevalence rates were as follows: *Ascaris* 2.3%; *Trichuris* 5.3%; *Enterobius* 2.6%; *H. diminuta* 0.1%; hookworm 0.1%; *Giardia* 10.6%; and *E. histolytica* 0.7%. Mixed infections of *Ascaris* and *Trichuris* occurred in 3 children; *Ascaris* and *Giardia* in 2; *Ascaris* and *E. histolytica* in 1; *Trichuris* and hookworm in 1; *Trichuris* and *Giardia* in 12; and *Giardia* and *E. histolytica* in 2. The percentages of medically unimportant species found in the survey were: *E. coli* 15.1%; *E. nana* 5.8%; *E. hartmanni* 0.3%; and *C. mesnili* 0.1%. Seven children had heavy or moderately heavy helminth infections: 2 with 200-250 eggs/smear, and 5 with 49-68 eggs/smear. Moderately heavy *Trichuris* infection with 14 eggs/smear was present in 1 child. None of the infected children demonstrated overt clinical signs or symptoms of parasitism. In general, the prevalence of intestinal parasites was high although the average intensity of infection was low. Since there are no long range plans to eradicate intestinal parasites in the United States, 4 practical control measures are listed for immediate and future handling of intestinal parasitism.

5760 ALTERED PARASITE DEVELOPMENT AND ENZYME LEVELS IN THE SMALL INTESTINE OF PARENTERALLY FED RATS. *(E.)* Castro, G. A.; Johnson, L. R.; Copeland, E.; Dudrick, S. J. (Univ. Texas Med. Sch., Houston). *Gastroenterology* 66(4):672, 1974.

See also, 5403.

GENERAL

Regional Enteritis

5761 EXCRETION OF CALCIUM AND CITRIC ACID IN PATIENTS WITH SMALL BOWEL DISEASE. *(E.)* Elliot, J. S.; Soles, W. P.; (VA Hosp., Palo Alto, Calif.). *J. Urol.* 111(6):810-812, 1974.

The 24-hr urinary excretion and concentration of oxalic acid, calcium, and citric acid were measured in a group of 10 male patients, aged 29-61 yr, with a variety of small bowel diseases. Hyperoxaluria was found in most patients, in those with a functioning colon and in those with an ileostomy and a nonfunctioning colon, suggesting that bacterial activity in the colon does not cause hyperoxaluria. Cultures of the ileal stoma showed few colonic bacteria, suggesting that bacterial colonization of the ileum is not a factor. Normal urinary oxalate and calcium in one patient with an absent colon and a normal small bowel indicated that a nonfunctioning colon and an ileostomy alone will not cause hyperoxaluria. Generally, the patients excreted small amounts of calcium and citric acid, with the reduction in citric acid excretion found in patients with idiopathic calcium oxalate stone disease. Although all urine specimens were supersaturated with calcium oxalate, the mean apparent solubility product for the group was significantly smaller than that of normal men or male idiopathic calcium oxalate stone patients. While hyperoxaluria undoubtedly contributes to supersaturation of the urine, the data suggest that something other than an increased oxalate excretion is responsible for the increased incidence of calcium oxalate stones. This other factor may be citric acid or an unknown substance.

5762 EARLY MANIFESTATIONS OF CROHN'S DISEASE IN ADOLESCENTS. *(E.)* Burbige, E. J.; Huang, S. S.; Bayless, T. M. (Dept. Med., Pediatr., Johns Hopkins Univ., Baltimore, Md.). *Gastroenterology* 66(4):669, 1974.

See also, 5551, 5619, 5621, 5731.

NUMBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

AACH, R.D.
5672*, 5684
ABBA, B.C.
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